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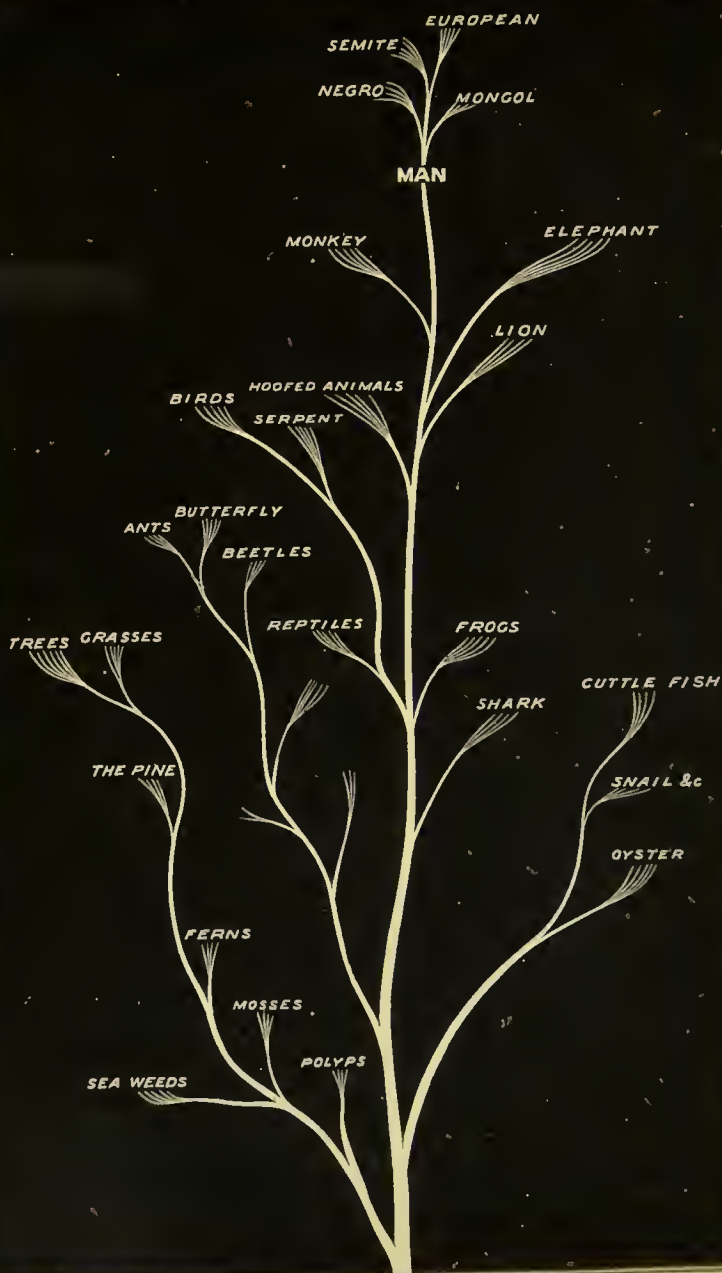
D. R. Daniel,

Four Crosses

Camdenwonshire

CHRONOS.

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THE FAMILY TREE.

CHRONOS.

MOTHER EARTH'S
BIOGRAPHY

A ROMANCE OF THE NEW SCHOOL

By WALLACE WOOD, M.D.

"One touch of Nature makes the whole world kin"

LONDON
TRÜBNER & CO., 57 & 59 LUDGATE HILL

1873

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Dedication.



TO MRS L. A. W. MITCHELLS.

MY KIND FRIEND,

You remember when we sat together upon the large rock by the sea shore, on a warm evening last July. We had discussed daisies, the cuttle fish, the immortality of the soul and Platonic love ; you became dreamy, and I remarked : " It is an awfully funny world." The expression pleased you, for you laughed again and again, and you have since repeated it to me every time we have met. The seed thus watered has grown to its present proportions ; it claims you as its other parent. Do not reject it.

W.

PREFACE.

To the young man of the period, born somewhere near the beginning of the present half-century, my work is addressed.

Three essentials, corresponding with the threefold nature of man, are in this age requisite for happiness ; a supply of money, plenty of loving friends, a sound conception of the universe and of the order of things. Life should be assiduously cultivated in its three aspects—material, emotional, and intellectual, if spiritual well-being is to be the result ; or to speak specifically, stomach, heart, and brain, must each be well kept in order to maintain a healthy condition of the organism. Hence the three things needful.

Now, in regard to the first two he wants no assistance ; both are his especial pursuit. In the acquirement of these, better than any of the generations that have ever lived, he *understands himself*. With respect to the latter essential, the case is different. If the

signs of the times are to be trusted, the world is on the eve of a colossal mental struggle. Already the great leaders in England and Germany and France—Spencer and Darwin, Haeckel, Taine—are marshalling their hosts. For the practical man who is not able to join in the strife, where will be found a refuge, when the fortress of Science on the one hand, and the bulwarks of Tradition on the other, by storm are taken and retaken, and the sacred ground of truth heaped with the *débris* of a battle-field? A feeling of general distrust, a vague forboding, pervades the air, and the young man knows not where to turn.

Our feelings are in harmony with our needs. Next to making money and making friends, no operation of the mind is so *pleasant* as the forming of a universal conception.

The social world is much like a kaleidoscope. Each succeeding age brings out a new figure. Three grand ages have found their expression respectively in the works of Homer, the Divine Comedy of Dante, and Paradise Lost. It is thought by many, that with the advent of Steam and Electricity, Music and the Novel, a new era has dawned. The race is no longer to the strong but to the swift. Speed takes the place of valour. Instead of killing our neighbours we outrun them. The watchword is *Parvenir*. *Progress, growth,*

evolution, this is the new idea. As past ages have produced the epics of Paganism, of Catholicism, of Protestantism, so the present age may produce the epic of Evolution. I have aimed at gathering and arranging the materials; its construction will be the work of the coming poet.

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CHRONOS:

MOTHER EARTH'S BIOGRAPHY.



INTRODUCTION.

Worlds have an infancy, manhood, and old age.—Things are not made, but grow; small acorns have become tall oaks; and simplicity has had its day.

THERE is scarcely a more agreeable situation in life than a quiet walk with your sweetheart out under the stars. The subdued mild light and calm tranquillity of evening are favourable for both thought and feeling. Above, there is immensity; within, there is immensity,—if the course of true love runs smooth; the starry heavens above us, the divine love within us—the height and the depth of our strongest emotions. Delicious hour! the little hand lays lightly, confidently in yours; you gaze on the glittering stars, and choose which shall be your dwelling-place when love becomes immortal.

“Give me Sirius, it is the brightest,” she would say.

“Let us rather choose Alcyone, up there in the Pleiades,” you reply. “That is the pivot of the universe.”

“How do you know?”

“Science teaches it. Have you ever studied Astronomy?”

“O yes, I know all the constellations, but I don’t like them. How white the Milky Way is to night! That’s your universe, isn’t it?”

“Yes, that is the great galaxy of which we form a part; see, it is disc-shaped.”

“Like a tea-saucer?”

“Yes, or more like this stone”—picking up an oval pebble; “when seen by the telescope the galaxy is found to be made of stars, just as this stone is of sand grains. It is *star substance*, of which the grains or particles are individual stars: the stone and the galaxy are philosophically the same,—particles of matter with spaces between them, yet all held together by attraction.”

“How funny! Then I suppose there are little beings in this stone that look up at its particles as we look up at the stars.”—

“And big beings who look down on the galaxy with as much contempt as we do on this stone, eh? You have an imagination truly Brahminic, my dear.”

A little pout at this, the compliment is a doubtful one. There is a short silence.

She explores once more the starry regions; you explore the white upturned face and think you never saw it look so beautiful before.

“The stars are of different sizes?”—finally.

“Yes, and of different ages also. There is infancy, maturity, and decline, no less in the stellar world than in the animal world—they look at a rough glance very much alike to us but they are not; no more than are the members of a city. The population of a city, you know, is not all grown-up men.”

“No, some are grown-up women.”

“Pshaw! don’t spoil my argument. I mean to tell you that men grow, and develop, and die, and that stars do the same.”

“So the stars grew, did they?” A new interest is created in celestial regions.

“If we had a telescope I would show you a nebula, a thin irregular cloud-like mass, composed of fiery vapour; there are myriads of these vague insignificant embryos in the heavens;

then there is another kind of star that looks like a whirlpool, still vaporous and vacillating, yet beginning to display its natural functions of turning round. Another kind you might see, of an elliptical shape, more condensed, more regular in form, the outside sometimes in act of separating in a ring from the central mass. Then we find a real sun like ours, sailing in glorious splendour with all his planets circling about him ;—finally, there are to be seen dense black masses, solid, solitary, cold—slowly and laboriously turning the few remaining revolutions which shall close their lives and begin their dissolution. Then the stars, no less than man, have a childhood, youth, and old age ; a growth, development and death. If I were a Shakespeare I might write the *Seven Ages of a Star*.”

“That’s very nice, try it—And first the nebula—unshapen, motionless,—Is a nebula motionless ? All right. And next a whirlpool—What about that ?”

“Well, say ill-directed energy, that’s characteristic.”

“A whirlpool next, with all the ill-directed energy of boys. And then the youth, fancying himself a man you know.”

“Ah ! thank you.”

“And then a sun—and then a cold black mass—Dear me ! is our sun going to be like that ?”

“True, his history will be that of all other stars. Science teaches us that one day, ‘the sun with all his planets welded into his mass, will roll a cold black ball through space.’”

A slight shiver ; the picture is not a pleasant one, and women do not like to look on pictures that are not pleasant ; for her, truth and beauty are synonymous. If you are wise you will take advantage of the shiver to draw the shiverer a little closer and test the warmth of affection in lines from Mrs Browning. If rather learned than prudent you will perhaps go on in this strain :—

“The similarity between celestial and animal life is much greater than at first appears. The lowest forms of organism

are mere patches of plasma like the nebulæ; both are indefinite in shape. Any slight perturbation divides the nebula in pieces; a polyp can be cut up indefinitely, and yet its life not endangered,—the concentration or attraction is very slight.

“While also the highly-developed animal is composed of unlike parts,—a central brain and peripheral muscles and nerves; and the star at maturity of a central sun and peripheral planets and satellites, all dependent on each other; the parts of the nebula and of the polyp, or of an embryo, are all homogeneous and independent.

“Take away the heart of an animal, and it dies, abstract Venus from the solar system, and all would fall in a chaotic crash; in the earlier stages, large portions of either may be taken away with impunity.

“In short, the difference between the earlier and later stages of both alike may be expressed by stating that the beginning of life is simple, the maturity is complex. In the infancy of star, or plant, or man, the particles are homogeneous, and do not cohere together—the form is indefinite; in maturity the *parts* are *unlike* and very dependent, the *form definite*, and the mass *strongly held together*; or again, the one state is simple, the other is complex.

“Now nature is one; all things follow the same law of growth. Listen then, little woman, who, from tradition of a Golden Age, have been taught to admire simplicity; who prefer the daisy to the rose, and fawn colour to crimson and gold. Weak, vague, incoherent simplicity is the beginning of all things. If you admire the confused and chaotic nebula more than the magnificent solar system; the unorganised and sightless polyp more than the multiplex formation and keen activities of bird or quadruped; the vague meaningless babbling of the infant more than the breathing thoughts and burning words of the mature man: then you may consistently prefer a simple cot to a brown stone front; the green simple country to the nervous

pulsating metropolis ; the simple pre-Raphaelites to Reubens ; those simple, sweet, and homely melodies to the opera.* Simplicity, little one, *simplicity has had its day*. Evolution is from an indefinite, incoherent, homogeneity, to a definite coherent heterogeneity, through progressive"—

The shrug of two very plump shoulders tells you you have gone too far. A gathering frown is chased by a satirical smile.

"What a capital missionary you would make. Come, Mr Definite Heterogeneity, I'm tired of star gazing, let's go in."

* "Put me in my little bed."—" *L'Africaine*."

PART FIRST.

BIRTH.

CHAPTER I.

THE AWFUL PAST.

THE FIRST CHAPTER OF HISTORY.

From the beginning of things to the birth of young Terra and her brothers and sisters.—First grand historic period.

THE chief cause of superiority among men lies in a superior mental capacity to take into account in their reasoning the element of Time. The savage cannot form a connected idea of the occurrences of half a year. The civilised man may comprehend the course of past events from the very beginning of the world; he can make provision for the future of unborn generations. Add to this the significant American generalisation that "Time is money," and we shall begin to realise how important a part is played by old CHRONOS in the mental organisation of the nineteenth century.

I want the reader to take advantage of this chronomic faculty which he possesses, and to strengthen it by exercise, forcing it to make a greater exertion than it has ever made before. I wish here to take a retrospective glance; I wish to take the most retrospective of all glances.

Roll back the few thousand years we call historic; add to these the millions of geological years, and to these millions of centuries; multiply the whole by millions, and quadruple the result: do not cease on the score of economy. If the Yankees' Wall Street adage is true, we shall never know the extent of our riches. We have still plenty to draw from; there is no danger of our reaching that famous *beginning* so imposing to our mind in childhood. We are nowhere near the

beginning of time ; we may, however, conclude that we have arrived at something like the beginning of our universe.

Let us again take a walk "under the stars," this time not taking the fair companion we had at the outset. There is now no earth for her to step upon ; there is no sun ; and, in fact, as you shortly must perceive, there are no stars. Orion and the Big Dipper have not yet made their appearance ; there is no round Milky Way now over us : all is darkness, silence, immobility. Where is the universe ? It is yet uncreated, unborn ; to speak more correctly, it is yet to grow. The materials are all there, though you cannot see them. The invisible atoms of matter which the chemist tells us know neither birth or destruction, are over all. In place of the galaxy which in the lapse of time becomes the starry heaven, the Milky Way is now an expanse of gas, a cloud of hydrogen or ether, *it is the universe in solution*. Of the amount of heat necessary for such an exhibition of things, I can form no estimate ; there is nothing so hot that it couldn't be imagined hotter, yet expansion here has doubtless reached its utmost limits—at least, we will suppose this to be the case. A reverse action sets in, the heat radiates, condensation begins ; there now—amid the profound darkness* a faint speck of light is seen in the centre of heaven ; it increases to a light, fiery, cloud—a central spot precipitated from the gorgeous diffusion, as a crystal forms in the bosom of a solution—this cloud is destined to be the centre and chief,—like Boston, the hub of the universe.

All bodies during the primary stages of growth first form a centre round which the particles revolve and oscillate. We see this centre in the cell as the nucleus ; it exists, no less, in the drop of water, in the crystal, and in the star ; and thus at this epoch, our young still invisible, wavering universe oscillates about its first formed fiery nucleus. The ages pass

* A mistake. The scientific Chaos is *perfect light*.

on and condensation continues, not evenly as perhaps might be supposed—water freezing, as all know, never forms an equal solid of ice, but little centres here and there are seen to appear, round which the icy particles collect ; all crystals are thus formed. In the organism too, where bone is to be produced, at first all is soft, and the hardening proceeds from certain well-defined points called by physiologists centre of ossification. So in the growing galaxy I am describing, there appear certain points of condensation, and each of the stars is the result of such a point.

“This law of the *germinal centre* is important ; it is the law of all formation, from a star to an insect ; the regular mineral, which seems so little related to man, has no other manner of formation ; it is a certain strong point which attracts and gathers up the other,—and Shakespeare and Nero were thus produced to a certainty ; even you, reader, who believe, perhaps, in the illustrious origin of your corporeal lineaments, you have for ancestors only a series of points—a curve that it would be quite possible to put in equation with x and y . I do not speak of the soul,—that divine emanation metaphysicians tell us has an origin the opposite of a point,—since it is infinity.” —But we must not get out of time ; I had forgotten that we were watching the growth of a universe.—Other fiery clouds, then, shortly appear in that portion of the heavens nearest the centre, where the power of attraction is the strongest. Time flies. Alcyone is now a blazing star ; he marshals the starry hosts around him, and those nebulae nearest him also assume the royal garb of fire, they are his courtiers.

There is a charmed circle of these glorious orbs lighting the expanse of darkness. Let us take our stand at the centre, where we can obtain a perfect view. The hosts increase ; farther and farther out into the darkness reaches the new light, contagious as it were, catching each nascent nebula and including it also in the celestial empire. Time flies, and now it would appear that the work of evolution is complete ;

many of the central stars are already on the wane; all the regions, it would seem, have now come out from chaos.

There is still some darkness in the outskirts, far from the centre, and in the suburbs where the attraction is still imperfect,—where the glow of centralisation is not yet felt. To a dweller in Alcyone these spaces are certainly of little account—to a solar inhabitant or a child of earth, they are important. That dark space yonder is to be the theatre of operations for the solar system. Young Sol is now about to put in an appearance. Late in the season and from the back woods—the very outskirts of civilisation—he will stand a poor chance of getting admission to the Court of Alcyone. What interest to us to trace the career of this poor late straggler after witnessing the rise, progress, and decline of a thousand greater and more favoured ones? Such, nevertheless, is our duty. We will not forget that greatness is but relative, and that to us finite creatures the solar system is quite large enough to inspire us with emotions of awe. We will proceed, then; even while we have been hesitating the same gathering cloud so oft repeated, announces the stellar germ a nebula; it is a very ordinary insignificant kind of nebula too,—fully as vague, and confused, and formless,—nothing particular about it to denote that from it shall come a planet which shall produce a man who will be born in the image of the great cause of all things. Condensation ensues; like all other nebulae it forms a nucleus; gradually the errant atoms encircle it until all are drawn into the vast fiery vortex,—a whirlpool of fire. To the aimless vacillating motions of atoms unrestrained, has succeeded the mad whirling rush of atoms forced into action against their will; vainly they try to escape, dashing outward in tangential lines as they approach the margin, only to be caught by the iron force of gravity and wound again into the vortex. They are receiving severe discipline, those atoms; a few millions of ages of this training, and they will be conquered; ever after they will come and go at the slightest call

of the stern old Newtonian master : the apple will fall to earth with all the docility imaginable.

See ! even now the struggle seems to have closed, and the turmoil ceases ; instead of mad turbulence there is now calm swift and regular rotation, while the unruly elements are gathered into that harmonious form, the *sphere*.

Our unhappy child is tamed, the corners all taken off. How beautiful is the sphere ! loveliest of forms ! form of the very cells which make our being ! form of our mother earth, our sun, and all the stars,—the Great Galaxy itself ! the type throughout all nature of perfection !

Our Sol has now fulfilled the primary function of growth ; he is next to enter on the greater one—the function common to all nature—that of generation.

Again the form is changed, the poles are flattened ; there is a swelling out at the equator ; a cloudy zone of particles are separated from the central mass. The parent again resumes his natural form, leaving thus thrown off in a ring the embryo of the first-born. It is a slender ring, and composed of light particles.—The ring is broken ; the segments integrate ; the child assumes the form of the parent : we will christen the first-born Neptune. Again the phenomenon occurs ; Uranus takes his place and begins his flight : faster, stronger, whirls now the great sun ; he is approaching the maximum of productive power : another ring is formed, larger than the others ; it will be Saturn, destined to be crowned with a halo and attended with his satellites. But the chief act is yet to come. The mighty whirler yet gains strength ; another swelling, another zone ; but the zone does not separate ; larger and larger it grows ; yet still it clings refusing to be disengaged, while the parent, as if proud of his creative power, still pours his exuberant force, still pours his vital elements, into the new offspring. Heavens ! Will the parent dissolve itself ? No, at last the monster progeny is free, a mighty son, chief among his brethren,—well named Jupiter.

No action in nature without a corresponding reaction. Thus ever when we see an extraordinary act in a series, we may invariably look for a falling below the average in the act succeeding. The sun has drawn heavily on his magnificent force ; he can never make another Jupiter or Saturn. For the fifth time a ring is formed, the smallest, slenderest of all ; can it be possible that so puny a fellow is to be abandoned and cast helpless into space ? Will it ever be able to survive ? will not some other system draw off its particles and scatter them in space ? Will not the giant Jupiter seize on its broken segments ere they can unite, and draw them into his own swollen mass ? Such in effect he tries to do, and though he does not succeed, he prevents the parts from uniting ; overpowered by the perturbing attractions of this monster, the segments cannot answer to the mutual attractions which shall make them one ; there is an abortion in the heavens. The giant Jupiter exults. " There shall be no more planets, no new interlopers between myself and the genial parent without whose rays naught can exist." Not so fast, young Jupiter ; there is yet another planet of moderate dimensions—not a hundredth of your own overgrown proportions—in the birth of which the writer and his readers are considerably interested. We shall see the *Earth* safely beyond the reach of your malicious attractions—little Mars too, and Mercury, and Venus. Smaller in size, but denser and firmer in matter, these four inferior planets are destined to be the scene of serene and joyous life, while you are yet torn and tossed by intestine storms. Go, Jupiter ; your long tumultuous belts of cloud cannot interest us as do the living continents and oceans of our nearest and smaller brother Mars.

The work of genesis is now complete ; the sun has grown dense and will probably give birth to no more planets. During the shifting scenes we have taken no note of time, which, continually flying, brings us down from the heights of *Alcyone* and the *past*, to the regions of the earth and the

present. We poor children of time,—veritable worms of the dust,—look up at our glorious sun and wonder if he will shine forever ; we survey our brother planets with telescopes, and speculate as to whether their inhabitants are capable of speculating about us. The galaxy, of which we occupy a remote and inconsiderable corner, is too far distant to concern us much ; we isolate and conceive portions of it after our lowly terrestrial fashion, and then satirise our own grotesque creations.

“We'll pat the *Great Bear* going up,
Use the *Big Dipper* as a cup,
As we tread on the *Milky Way*.”

It is by such steps that the human soul is developed, until, swollen with pride and finally shaking off its trammels, it thus dares to laugh at the bounds of law and matter.

THE CONCEIT TAKEN OUT OF US.

“The law of the origin of the world was discovered by the German philosopher Kant, in 1755.

He first conceived the great truth that the matter of which our solar system is composed, was once in a gaseous state,—a vast incandescent cloud, extending over a space much greater than the entire system now occupies.

Such a cloud being composed of minute particles of matter, would exhibit immense heat and but little attractive power. By the slow radiation of its heat, a gradual condensation and attraction must ensue. From the conflict of the two forces, condensation and radiation, it can be shown by the laws of mechanics that a circular motion must result ; as condensation increases, so must the rate of rotation, and this rapid rotation in turn generates a powerful centripetal force, which finally throws off the outer particles in a ring or circle, as water is thrown from the rim of a carriage wheel ; this ring, being left outside of the condensing mass, is ruptured, and its parts aggregate together into a rotating mass—a planet. Again and

again the same phenomena occur, as the several planets are formed, until the mass, finally becoming too solid for further modification, remains in the centre as a sun. This process of evolution is one which is constantly going on throughout all the heavens.

How the study of astronomy enlarges our views of things ! As the science has progressed we have learned successively, contrary to our vain illusions, that our little earth is not all the universe ; following this, that it was only a planet ; and then, that this planet, far from being a marvel among the others, is, on the contrary, one of the smallest and most insignificant ; in the fourth place, that the sun,—centre of our system, that we are accustomed to take for a unique colossus of splendour—is only a very mediocre star ; and now we must learn that our system entire is but a grain of sand in the immensity of the galaxy visible over our heads.

But the galaxy, finally says the reader, who is certain to find something absolute, something of importance enough in the universe to build a foundation on. Our galaxy, then,—the visible starry heavens, O reader, not skilled in metaphysics, and who forgets that sizes are nothing more than *relations*,—“ is but a particle of dust itself before the like myriads that people immensity.” *

* ORIGINE et FIN des mondes.

CHAPTER II.

THE AWFUL FUTURE.

PEEP INTO FUTURITY.

"This world is all a fleeting show." How it will end.—The Judgment day.—Cosmos becomes Chaos.—Tableau vivant of celestial history.

INERTIA is that property of all things by which they are opposed to a change of state. Man possesses this quality in an eminent degree, for his chief characteristic is laziness ; he works, and even moves only when he is forced to it. In his airy visions he sees all other things in the condition which he desires for himself—perfect repose, fixedness, stability. The eye, too,—that chief source whence he derives his ideas of external things,—sees the world only in pictures, and pictures must necessarily be motionless ; thus the delusions of instinct are strengthened by the illusions of sense, and he has come to regard rest as the rule, and change as the exception ; the popular idea of a great man is one who never changes his opinion ; of a good world, no less than a good house, that it be fixed and enduring.

This belief is also said to be *childlike* ; the child believes that the cradle it lies in, and the spoon that feeds it are the fixed order of all things.

We of a later generation can never appreciate the mighty struggle that took place in the breast of man before he could be forced to realise that the great green earth, so solid and steadfast, the *terra firma*, was but a dancing ball, swinging through the air and turning complete somersaults with every rising sun ; and even now, after centuries of progress, it is equally hard for man to realise that this continual doubling, tumbling, turning, and transformation, is, in fact, the whole of life, and all there is of life—of anything ; that the notion of

rest at all is illusory and artificial; that there is absolutely no such thing, *never was and never can be* such a thing, as rest.

“All is action and reaction in this world. When you give your neighbour a kick, you draw upon yourself another in return; it is the same for a smile or benevolent act. Mechanics and morality, which do not always run in the same channel, are in perfect accord upon this point. It results, then, that when one body attracts another, this also draws the first. All masses attract all other masses,—‘directly as to the mass, inversely as the square of the distance.’ Even the great centre of the universe around which all circle, is drawn hither and thither itself by these manifold attractions on all sides. Even Alcyone, the centre of the galaxy, the most stable thing which of all others we can imagine;—Alcyone the pivot of the universe, in the midst of the many forces which in all directions solicit, is destined ever to waver, hesitate, vacillate, and change its base. Let us no more wonder that men and governments do the same in spite of themselves and after such an example. When the very *base* of all that exists oscillates like a pendulum, can it be otherwise with all that exists? Absolute repose is a chimera to be classed with “honest politicians and sincere courtesans.” *

Then you are young men; you sit softly ensconced in your arm-chair, your well-formed boots resting upon the mantle; eyes half closed, the soft smoke curling about your charmingly combed locks; you are reading the *Herald*, and you fancy yourself in perfect immobility—that in your after-dinner siesta you are tasting an absolute repose; very well, now do you know what a mad galop you are taking in that indolent moment?

First you are turning round the axis of the earth with a speed which, in our mean latitudes, is scarcely less than that of a ball from the cannon; secondly, you are racing round the sun at the no trifling speed of sixteen miles a second;

thirdly, you are whirling with the sun system, and all round the great nebulous centre of gravity, at a rate not yet determined; fourthly, you participate in the motion of that nebula round Alcyon—the grand galactic centre; fifthly, you are driven hither and thither by the fact of the attraction of your star neighbours in an ascending course of perturbations; sixthly, and finally—errors and omissions excepted—you submit to the counter perturbation of the great centre. Now then, deny, if you dare, the old proverb that “appearances are very often deceptive, and exceedingly deceptive.”

THE END OF THE WORLD.

“A French philosopher mentions five stars of which he had the honour and melancholy pleasure of receiving the latest sighs at the end of his *lorgnette*. Herschel, after having proved the disappearance of a notable number of stars by a comparison of ancient catalogues with the new, had also the honour to assist at the last moment of one of these stars, and to register its decease. It was the fiftieth of the constellation Hercules. For some time it had been observed gradually to pale its fire—the sign of approaching dissolution—then it passed to red, and feebly scintillating for a dozen years or so, it gave up the ghost; its flame was extinct, and it departed for ever in the profound depths of night.

Thus, the fact is placed beyond a doubt; suns die in the heavens as poor common mortals die on the earth. Nothing can resist the destructive changes of time. All that is born perishes—or rather is transformed—and universal life is but an immense current of molecules that pass incessantly from one combination to another. All is fleeting and transitory in the midst of immutable *law*.

Well, ladies, continue to believe in the eternal flame of your lovers, when even the suns themselves cannot without perjury protest as much.

It is scarcely necessary to observe here, that long before such

an extinction of solar fire the life of our globe must cease. No one of the great human races that are to succeed us is to be present with the sun in his last moments ; long before that capital disaster, all that live will have passed to other destinies. The supreme transformation will come on very gradually, and how, we may easily conceive. The growing feebleness of the solar radiance will have the effect gradually to increase the extent of the frigid zones ; the seas and continents of this portion of the earth will refuse to support life, which will slowly retreat towards the equator ; those species accustomed to warm climates will be the first to perish, and their vacant places will be filled by immigrants driven from the north by the extreme cold ; man, who by his nature and his intelligence can resist the lowest temperature, will resist the longest ; he will remain alone upon the bosom of nature in her mourning. Clustered close round the equator the few remaining sons of earth will engage in the last, the supreme and awful combat with approaching death. It is precisely at this awful crisis when the grim shadows approach, that human genius fortified by scientific acquisition of centuries past will soar forth with its clearest brightest flame. It will be like the last chant of the swan,—the last flash of divine light upon the mouldering remains of earth. Who can describe the prodigies of that colossal struggle, when all terrestrial humanity, reduced to the last ditch, shall fight, as a powerful gladiator being buried alive would essay to dash from him the fatal clods which threaten to engulf.

Poor philosopher ! leave thy pen and quit thy place for that of a poet worthy to sing such an epic.

But to return to the question of the final end of our race : there is every reason to suppose that the agony of death will be shorter than the present slow cooling of the sun would lead us to suppose.

Humanity will die like an aged veteran, who, having finished

his laborious career, passes quietly but suddenly away, rather from the exhaustion of the vital forces than by infirmity.

That the human species may arrive at the perfect harmonious life that awaits it, six thousand years more will be necessary; this, with the four thousand of civilisation already passed, will form our social adolescence; there will be a hundred thousand years of maturity, when the dream of all Utopians must be realised and society be perfect; and after this there will be,—by the action of the same mechanical law which gave it birth, and warmth, and nourishment,—an extinction of life.

When will this take place?

Many calculations and speculations have been made as to the number of years which the human race have yet to live. The exact number it is not important to know; it will be thousands, perhaps hundreds of thousands, of years; and the tenth of such colossal periods to us finite mortals, who call the years of the past century, “The olden time,” is long enough to raise horizons where the spirit loses itself in infinity.

Hundreds of centuries,—a hundred thousand years at the least,—we may depend on. Taking this period as a basis, it is easy to see that our boasted civilisation, with its science and society, and its arts, can represent in reality nothing more than the confused origin of a destiny, that will surpass in its splendour anything which our highest aspirations ever sought. With our little four thousand years of social history, we can but represent, in view of the immense number of centuries to come, the embryo scarcely formed, lingering still in the matrix of chaos.

Thus is explained without effort our contradictions without number; our fratricidal wars, our puerile controversies, the universal anarchy which still reigns,—in a word, all the miseries in the midst of which we are agitated, and which will certainly disappear before the regular development of the germs that

are within us, as the imperfections of infancy are effaced at the arrival of mature age.—*Origin et Fin des Mondes*.

It is quite probable that we are destined to a more terrible fate; for death by violence in the organic world is a thousand, a million times more common than natural death; it is the rule and not the exception, and it may be so in the world celestial; final dissolution is, however, just as certain, though no such accident happens; there are limits to condensation no less than to rarefaction; though we learned at school that the earth, if solid, would occupy but a cubic inch, we were convinced that it could not be compressed into a cubic half inch, for we must stop somewhere. When equilibrium is at last reached, look out for the reaction; melting follows freezing, and freezing follows fusion, the world over. There is no need, then, to picture a collision in the heavens, and send the galaxy out in an overgrown railway accident, for it will finally melt by the sheer force of its own concentration.

CELESTIAL TABLEAU.

Nothing in the world insures success like clear conception. We human beings have a head much like a large box heaped with those chopped-up pictures which are given children as puzzles to put together, and the most of us not only do not know how to match the pieces, but we don't even dream that there is a possibility of their being combined into harmonious wholes. We stare at the great oddly-shaped pieces of red and green, and wonder what such absurd things could have been made for, and we pronounce it a strange world.

Heaven hasten the day when there shall be more who have the ability to work out these puzzles, and with a disposition to *hang out* the perfect pictures. I fancy I have such a picture now before my eyes. It is made up of the fragments which Copernicus, and Galileo, and Newton have handed down to us. Would you like to see it?

(1.) Fancy the room you sit in is filled with steam,—an in-

visible yet material vapor. (2.) Close the eyes, open them, and see instead of this vaporous expanse, a cloud in the room's centre as large as your hand; shut once more and open them, and exactly in the centre where the cloud was, there is a globule of ice the size of a pin's head. Regard well the picture, you, who, from tenderest infancy, have had it impressed upon your receptive tablets that there is an awful unknown something, somewhere; for in that simple image, I assure you upon the authority of the intuitions of the age,* will be found the true root of the matter.

Take advantage now of the photographic art, and enlarge the carte to life size; let us have a grand celestial tableau of six scenes.

- (1) A vast expanse of uniform ether or gas.
- (2) An ocean of clouds, of nebulæ.
- (3) An expanse of suns with their planets.
- (4) A collection of solid black lumps.
- (5) Their number is fewer—perhaps one large frigid mass.
- (6) Rarefaction, either by explosion, crash, or fusion, and the result is the repetition of the first scene; and thus again and again for ever.

The question of creation is thus seen to be a question of meteorology. The story of the snow-flake is the story of the star. We need not then, it would seem, look upon the phenomenon of heaven as a special mystery, for the great universe itself is literally and truly *but a snow storm on a grand scale*. It is one division of a rather common subject,—the weather.

* See *First Principles*.

PART SECOND.

INFANCY.

CHAPTER III.

THE STORY OF MOTHER EARTH.

HOW WE USED TO REGARD HER, AND HOW WE REGARD HER NOW.

—WHAT SHE HAS TO SAY FOR HERSELF.—A STORMY GIRLHOOD.

“In ancient days when mother earth was young.”

“AMONG the great mental productions which serve to divide into distinct stages the development of human knowledge, few are of greater importance, or have extended a deeper influence, than the system of the world, invented by Copernicus.

“A thousand years the spherical astronomy of the Egyptian Ptolemy had dominated the mind of all cultivated men. In most perfect harmony with the evidence of our senses the Ptolemaic system exhibited our mother earth as the fixed unmovable centre of the universe, over and around which sun, moon, and stars moved in concentric circles ; their movements were from east to west, as every man may each day bear witness. This system corresponded with the teachings of the church, and with the inspiration of the greatest poets.

“What can, in fact, rest more safe and sure than the Ptolemaic system.

“Doth not the heaven above us arch ? Lies not the earth firmly beneath, and the eternal star, twinkling so friendly, climbing aloft ? Might not every reasonable man with eyes see, and with hands grasp the fact, that the earth, firm and tranquil, remains in its place, while about this grand centre revolves the stars and planets ?

“In what perfect accordance with this view, also, was that of the position of man in nature, for was not man—this God-like image—the last aim and highest purpose of creation ; was he

not the true ruler and masterpicce of the earth, even as the earth was the grand centre and masterpiece of the universe?

“The long and mournful night of the dark ages was followed by the morning glow of the sixteenth century, with its sweeping progress, and its startling revolutions in all departments of human knowledge and belief. And amid this morning glow there arose a star of the first magnitude, the German Copernicus, whose work, ‘The Revolution of Celestial Orbs,’ (*de revolutionibus orbium cœlesteum*) itself created a revolution, both deep and lasting in the mind of the world. It is true that Copernicus did not live to witness the effect of his great deed, as the proof sheet of his work came to him only on his death bed. But numerous eager scholars and disciples were ready to spread the truth, and in the hands of Kepler and Galileo, the Copernican system was a glorious victory. In vain sought that keen observer, though equally unclear thinker, Tycho de Brache, to save the Ptolemaian—or at least to fuse it in with the Copernican,—to find a middle course. The simplicity and clearness of the claims of Kepler and Galileo were so striking, their mathematical proofs so convincing, that shortly every clear-reasoning and unprejudiced learner was possessed with the startling idea:—The earth moves! it rolls daily upon its axis from west to east! it is a star among stars, a planet among the other planets, which with the rest, pass with lightning speed round the sun!

“Scarcely can we represent to ourselves the effect which this sudden development in the knowledge of nature and humanity produced upon the world of the sixteenth and seventeenth centuries, then first awakening after the long sleep of the middle ages. It was not alone the rude, uncultivated masses who raged and hooted against the absurd doctrine which would appear to make everybody stand upon their heads, and which was every way so contrary to the plainest common sense. No, even learned men and thinkers hesitated long before daring to give up the old classic and firm-rooted dogmas.

Many of those who saw with the greatest clearness the truth of the new system, and were its adherents, were terrified, and forbode for the spread of the truth the direst results, and hence, sought by all possible means to disparage it and cover it up. Especially was it feared that the authoritative teachings of religion and the church would be shaken; the priesthood saw their power in danger, and with loud cry, rose up to contradict the Copernican system with all the eloquence and the arrogant authority inspired in them by the Mosaic writings and the infallible descendant of St. Peter.

"The entire moral order of the world and morality in human life would fall and be blotted out with the fall of the Ptolemaic system. With fire and sword must be destroyed the dangerous heretics who spread such immoral teachings; and it is well known what diabolical tortures were at this time developed by the Christian Inquisition thus to "Honour God."

"Old Galileo, the greatest genius of his time, languished for years in the dungeon of the Roman Inquisition, forced to repeat in prayer weekly the Psalms of David; and kneeling before illiterate monks with hand stretched upon the open Gospel, solemnly renounce the eternal truth which was so clearly known to him. But his proud words, '*And yet it moves,*' pronounced invariably after the oath, as he rose to his feet, have become the motto of every student, who, with dauntless courage, struggles to disseminate the truth of nature, battling against superstition and priestcraft.

"In vain were all oaths; in vain the commands to the earth to stand still. '*It moves, nevertheless.*' Yet long and severe was the persecution and the strife; and again it was renewed and redoubled, when, by Newton, was made the greatest of human discoveries, that of the law of gravitation."*

Such a history as this teaches us a most remarkable lesson,

* *Haeckel Entstehung.*—A. Stammbaum.

viz.: common sense, according to its general acceptance, is the worst guide we can have in the search of truth.

An immense liquid fireball, so much cooled as to be covered with a light crust, which, though still crackling and seething at certain points, is coated with the light green mould of vegetation; the huge mass wrapped in its own vapour of water and air, tumbling upon itself like a whip-top, and rushing madly through space—such is the modern conception of the world.

This view, though but the truth, is opposed not only to common sense, but it is opposed to beauty, to our ideas of fitness, to all the teaching of ancient sages; it is contrary to all our poetry, both sacred and profane, contrary to our reasoning every day of our lives, and contrary to the almanac.

In the latter, we read that the sun rises and the moon sets; our cherished poets tell us of the “beautiful blue vault, studded with stars;” or again, these same stars are, as a child once said, “holes in the floor of Heaven to let the glory through.” The broad, green earth stretches out fast and firm beneath our feet. The heavens arch in a beautiful bridge above, safely and lovingly enclosing us.

“Above the hills, in the blue distance, rise
The mountain columns with which earth props heaven,”

while in this arch the two glorious orbs are daily hung for our illumination.

Thus, face to face are brought the two theories—the poetic and the scientific, the old and the new. To repeat:—the earth is a flat, immovable, and solid block, of gigantic proportions and a greenish hue. It is surmounted by a vast sort of blue bowl, invested and thickly set with brilliant golden studs; into this bowl, also, are fastened two movable globe lamps. This is the “old standard,” or classical theory; it is the one which ruled the world for thousands of years, and still continues, in a great measure, to rule it, for it pervades all our literature, all our art, all our religion. The contrary

theory, that the earth is a cooling fire-ball, whirling and flying through space among ten million others of larger and smaller proportions, is new in comparison with the other, being some three centuries old. It has yet made no great impression upon the mind of the mass of humanity. In the most obscure corner of a great library only, you will find it explained in severe and technical language, under the name of Astronomy. The other lies upon every table.

Closely upon our idea of the earth's form and function, and depending upon it, must follow our idea of the earth's origin. The first question man would naturally ask would be: "What is the earth?" and the next, "Where did it come from?" Having seen the history of the idea of the cosmos, let us next trace the history of the greater idea of the origin of things.

The mind of one of the ancients, as compared with that of us moderns, was marvellously simple and clear; it was like a page from the child's primer compared to a page from a work of exact science.

Let us suppose that a child of the present day, in looking around him with the natural curiosity of infancy, should attempt, without help from others, to account for all the queer things which impressed his senses. Very naturally he would fancy the state in which he lived—New York or Massachusetts—to be the limits of the universe, shut in by the heavens—a flat plateau of irregular shape. Just so appeared to the ancients the little land bordering upon the Mediterranean. This plateau he would picture to himself as circumscribed much as a man might lay out a garden; the adjoining body of water—gulph or sea—would impress him as a repetition upon a large scale of the lakelet or pond, which he may have observed the gardener create; river beds, too, he would conceive to have been dug out in accordance with his own experience of digging tiny trenches with a stick in the soft earth; animals—those curious machines—he would presume to have been constructed much after the fashion which he

had seen the artist carve a statue, or the mechanic construct a watch. He would thus, in his inexperienced simplicity, fancy that he comprehended the plan of nature; in considerable glee he feels that were he a little more potent, a little more than himself, he might execute an equally fine scheme.

The declaration of the heathen king, when first the creation was explained by the missionary, "I wish I had been there, that I might have given good advice," was the natural expression of the inexperienced man.

So the child, no less than the barbarian or the ancient, would conclude that a great wise man had made all these things at some certain time in the past; and this explanation is the old, the very old, and standard one.

For an immature imagination, it was a very natural invention. Side by side with the idea of the fast flat platform and the studded vault, this belief prevailed; side by side with the Ptolemaic system, of the world as the grand centre, and the sun, moon, and stars merely its decorations, this conception held sway.

A large picture exhibited at Goupil's Gallery during the spring of 1872, created a sensation. This picture represented a middle-aged man, somewhat above the ordinary size, with long flowing hair and beard, clad in a loose brown robe, and sitting upon a cloud, while the surface of the earth was to be discerned beneath in a bird's-eye view.

The work is intended to be a picture of the creator or originator of the earth,—a full-length portrait presenting him at the moment of having finished the undertaking. Such a work dropped into the midst of the busy Metropolis might well cause astonishment in the beholder; it is not to be considered a product of the time, but rather a revived relic,—like a new photograph of some antique mouldering statue dug from the Nile ruins; could this picture of the creator be transported backwards into the middle ages,—had it appeared in the time of Charlemagne or Richard Cœur de Lion, it would have been the

admiration of the world. It harmonises perfectly with their conceptions; nay, it is the very image perfected of what must have been continually present to the minds of our ancestors for thousands of years before the days of Newton.

Fixing, then, this picture fairly in our eyes, let us read a page or two from an old French book, the "Sacred History" of the Church.

After preparation by careful reading of the book of Genesis, upon the naïve imagination of the pious old monk would arise just such an image as the one at Goupil's Gallery. In a plain childlike fashion, he would narrate the undertaking as I have it narrated in the work before me.*

The revolution of Copernicus and Newton came: the image of the green block and blue bowl was banished for ever from the mind of the thinking man, and in its place there rolled an illimitable wilderness of burning orbs, rushing and whirling in circles of inconceivable magnitude, all following that strange abstract force called gravitation. It was no wonder that the soul was bewildered by such a flood of light; no wonder that for this stunning and awfully grand idea of the universe there arose no ready answer to the question, *whence?* King Science had ruthlessly:—

"Thrust far back the heavens so neighbourly with men of old,
To voids sparse-strewn with alienated stars."

Remorseless, he had broken the cherished idols of the past, all hallowed by inheritance as they were, and yet had given no material and no plan for the formation of newer and better inspirations.

It was, then, a long time before the Copernican plant bore its legitimate fruit; during the seventeenth and eighteenth centuries its flowers were multifold, and at last, amid the throes of a new and greater revolution, there appeared Lavoisier and Laplace. There, in the University of France, while the storm was gathering around him, quietly stood Lavoisier

* A. Ainate.—*Petite Histoire Sainte*.

the scientist, and uttered the following simple but memorable words:—

“Let us suppose that by some cause or other the mean temperature of our atmosphere passes from ten or eleven degrees,—the actual mean,—to one hundred degrees, the temperature of boiling water.

The water of all our rivers, of all lakes and seas, would be transformed into a kind of vapour. All animal and vegetable life would cease to exist. Elevate the temperature to three hundred degrees; lead, zinc, and tin would liquefy; these metals would flow as mercury flows at the present temperature. Carry this supposition to its utmost limits; there is no heat, however ardent, but that it might be conceived hotter; no amount of cold so extreme but that we could imagine a colder. We thus arrive at progressive temperatures, at first reducing all the matter of the earth to an incandescent state; next it appears in a state of fusion,—at last in a state of vapour; this vapour being heated more and more, would finally dissipate itself in space; the earth would have ceased to exist.

Let us now, in our imagination, reverse this process; gradual coolings cause, first appearance of the vapour; still further cooling and condensation reduce it to a state of ignited fusion, and so on; thus, finally, the earth after passing these successive stages which our imaginary planet has passed, would arrive at its present actual state.”

From this utterance dates the new era. It is the beginning of THE PRESENT AGE.

Toward the close of the last century, Captain Wilson, commandant of the Royal Ship of War *Endcavour*, which was wrecked in her making passage from China to Europe, was cast, with a few of her crew, upon the little island of Orlong, an island which no other navigator before him had ever visited. The savages who inhabited these islands had never suspected that there existed, beyond them, other lands, inhabited by other people than themselves; this small

cluster of islands, beyond which they have never journeyed, were for them the entire world ; and its population, as they had believed in good faith, comprised the entire human race. Those who have never reflected upon the immensity of the universe, and upon the truly infinite variety of beings that compose it, are somewhat in the condition of these simple honest savages. They cannot suspect, and it is difficult for them to believe in, the existence of the greater part of the wonders of nature.

Believing, after all, however, is nothing compared with the difficulties of utilising what is learned. From astronomy we learn of the worlds innumerable, scattered like grains of sand through the vast space to which man can set no limits. The solar system is but one among untold numbers. Our planet, without being the most insignificant member of the system, is by no means one of the largest, and when compared with the sun, if the latter were represented by a globe two feet in diameter, the relative proportion of the earth would be but the size of a dry pea,

A GRAIN OF SAND FLYING IN SPACE.

The savage and the unlettered man, doubtless, are not incapable of learning this fact, but from it an intellect of so low an order can draw no useful conclusions ; even in the spiritual soil of the European mind, the great truths have been slow to take root, tedious of growth, and backward in flowering. Happily, to the higher races of the present day, the modern conception of the universe is reduced to practice. It is rapidly coming into use as the stimulation to right conduct, and bids fair to supplant entirely the theory of future punishment. "The starry heavens above," and "the moral law within," are enough to *shame* the educated man into doing his duty. Never before to-day was the saying so true, that "knowledge is virtue ;" never so true the saying, that "knowledge is power." A century ago the world was filled with good-hearted men, who daily perpetrated acts of

which barbarians ought to be ashamed, and, as a product of the same age, in the Lord Dundreary type now extinct, is seen the premium once paid to stupidity. The Revolution has come and gone; to do right in these democratic days, one is obliged to become a student; he must learn what right is, and he must learn it for himself. *Intelligence* is to-day the only distinction among men. The road to success in any direction, be it in morality or in finance, is through science.

“As industry attains higher stages of its developments,—as its processes become more complicated and refined, and competition more keen,—the sciences are dragged in, one by one, to take their share in the fray; and he who can best avail himself of their help, is the man who will come on uppermost in that struggle for existence, which goes on fiercely beneath the smooth surface of modern society.”

What are the sciences here meant? They are embodied in the histories of the stars, of the earth, and of life.—*Astronomy, Geology, Biology.*

Let us cast a hurried glance at the second of these, before taking up the more important one of life,—the last and greatest of all.

THE EARTH'S EARLY TRAINING.

“She is a star.” Mother Earth to-day, in the full bloom of her maturity, is indeed noble and beautiful. Her body is now compact and firm, and it is moulded into the most perfect form. Lovely is our mother earth! Some day we shall learn to feel a true affection for her,—to *love* and reverence her as a parent, our great and only friend.

She wears three robes, an inner one of green velvet, another of water, and an outer of heaven's own blue air. Strip her of these garments, one by one—airless, waterless, lifeless, she now appears a dead star, a corpse. Thus she will be one day in the future. But it is of her past I wish to speak; then she disdained these same staid matronly robes, tottering and

tumbling through the heavens, a fiery red infant,—rebellious, chaotic.

Listen while I again reveal to you the strangest and most awful facts which the mind can contemplate. This beautiful mother, with all its wealth of laughing water and cloud, its forests, and cities, and human souls, in the future *will be* a shrivelled black rock, lonely and cold; in the past *was* a ball of liquid fire. The three pictures should be framed and hung in our hearts; such a triad is the true conception of the “voyage of life.” I love to catch the lightnings from the rising sun, and from Sirius and other blazing youth, and say, “Such we once were.” I tremble to look on the pale cold moon, with her ghastly shrunken features, and say, “Such we shall be.” But in the light of these two comparative stages, I climb to the mountain top, and with what rapture I gaze upon the scene below, saying, “Such we are.”

The *child*, the *man*, the *aged veteran*,—these are the objects for the study of the moralist. A *star*, an *earth*, a *moon*,—these the studies for the philosopher.

What sort of an education do you prefer your son to have, a classical or a scientific? Both—neither—but something practical; let him thoroughly understand the above half-dozen subjects, and he will be an educated man—he will then know how to make money and how to die.

But I am digressing. I set out in this chapter to tell you how our earth looked, and what she was like in these ancient days when she was a star. I will be very plain with you, appealing directly to your reason and not to your failings. Descending from the heights to the depths for a simile; I do not hesitate to say that in those days she was as are all stars, very like a hasty pudding; the same colour, about the same consistency and motion, and breathing in just such little volcanic gusts. I trust she will pardon this liberty; in the next act I shall ascend from the kitchen to the parlour, and she will be seen appearing in a new and better light; she will

then appear like a bouquet; and her passage from a state suggestive of the one to a state suggestive of the other, is her true biography. It is a very beautiful law by which this pudding-like mass, slowly cooling, shoots out such wonderful crystals as diamonds, and flowers, and men. This I have also to explain.

The materials are not yet at hand for working out completely the history of our mother's adolescence. Historic geology is yet in a rudimentary state, yet enough has been learned to show us that her youth was like that of all youth. "The passions begin to assume their tempestuous sway, the soul obeys the irresistible impulse of desire; no object feebly impresses as in childhood, but everything violently excites; life is made up of enthusiasm and passion; strength marks the movement; the *blood glows with fire*, pride in the looks; one delights to raise heavy burdens, leap wide ditches, pursue the stag and the fierce wild boar. Without having as yet any enemies to combat with, youth grasps and brandishes his weapons; *the vague desires have no fixed aim; the labours are not regulated*; difficulties tempt, danger attracts, a trial of strength seems a triumph; always a Hercules impatient to overcome monsters, yet the active desires have no fixed aim; one grasps at all things without securing any."

The truths of geology are too well known to make it necessary that I should dwell upon them. I shall only cite a few facts from French and English manuals, merely for the purpose of refreshing the memory.

"Thus the earth is the child, and the moon the grandchild of the sun. When our planet first came out into the world, it was merely a solar fragment,—a chip of the old star,—and the other planets were in a similar condition. Our little earth cooled quickly, shrunk in size,—it had once extended to the moon—and finally *went out*. From a globe of glowing gas, it became a ball of liquid fire, enveloped in a smoky cloud. When first we are able to restore its image, and examine its

construction, we find it composed of zones or layers, in a molten state, arranged according to their weight; and above it we find an atmosphere also divided into layers. Close over the surface, vapour of salt was suspended in the air; next, a layer of dark, smoky, carbonic acid gas; next, oxygen and nitrogen, and vapour of water, or common steam. Within the sphere, as it cooled and changed, chemical bodies sprang from one another, rushed to and fro, combined with terrible explosions; while in the variegated atmosphere above, gas hurricanes arose and flung the elements into disorder. So sped the earth, roaring and flaming through the sky, leaving behind it a fiery track, sweeping round the sun in its oval course; year followed year, century followed century, epoch followed epoch. Then the globe began to cool upon its surface. Flakes of solid matter floated on the molten sea, which rose and fell in flaming tides towards a hidden and benighted moon.

“The flakes caked together and covered the ball with a solid sheet, which was upraised and cracked by the tidal waves beneath, like thin ice upon the Arctic seas. In time it thickened and became firm, but subterranean storms often ripped it open in vast chasms, from which masses of liquid lava spouted in the air and fell back upon the hissing crust. Everywhere heaps of ashes were thus formed, and the earth was seamed with scars and gaping wounds. When the burning heat of the air had abated, the salt was condensed and fell like snow upon the earth, and covered it ten feet thick. The Atlantic and Pacific oceans, lying over head in the form of steam, descended in one great shower, and so the primæval sea was formed. It was dark, warm, and intensely salt: at first it overspread the surface of the globe; then volcanic islands were cast up; and as the earth cooled downwards to its core, it shrivelled into folds, as an apple in the winter when its pulp dries up. These folds and wrinkles were mountain ranges and continents appearing above the level of the sea.

“Little by little the solid crust gains in firmness and thickness; the upheavals become more and more rare, while their remains appear in huge fragments of the torn and upheaved crust, here and there, over the surface of the globe, still excessively hot, forming in places vast rugged lines, which, as the cooling goes on, become more clearly defined in outlines; these were the first mountains. To this remote epoch it is not possible to assign a date; there was then on the face of the earth, in the valley as upon the mountain, but a single substance—*granite*. In this granite—very justly called by geologists, *primitive rock*,—there could be no trace of organised bodies,—neither animal or vegetable life had yet begun upon our planet. To form a just idea of the importance of these primitive rocks it will suffice to remark that they form about ninety-two one-hundredths of the entire thickness of the earth's crust. All the others together thus making but eight one-hundredths, that is to say about the dozenth part. The summits of the highest mountains in the new world, as also upon the older continent, are of granite, and it is also granite that is discovered at the most profound depths that subterranean labour has penetrated.

“At a certain stage of the cooling of the primitive rocks, the atmosphere charged with vapours, which the excessive heat had for a long time prevented from condensing, deposited upon the earth a portion of the water which it held in suspension, while at the same time the elements of water combined in the interior of the earth were forced to the surface as the mass contracted, and gradually filled the basins of the seas and oceans already prepared to receive them. New upheaving, causing new fractures in the crust after it became thicker, have, at divers times, changed and displaced the basins of the sea; thus, the great deserts of Cobi and of Arabia, in Asia, and of Sahara and of Lybia, in Africa, were undoubtedly at one time the basins of vast seas, displaced ages before the earliest historic times.

“Finally, those portions of the earth which were left uncovered by the water were covered with vegetation; animal forms of the inferior order made their appearance in the waters, now sufficiently cooled to support them. Enormous atmospheric phenomena, of which the terrific hurricanes and tornados of the present day are but feeble reproductions, joined the partial upheavings, broke up, pulverised, and mixed the various substances comprising the crust of the globe, and gave birth to the vegetable world, which at the commencement did not exist.

“The place occupied by the Pacific Ocean was formerly a vast continent traversed from east to west by a chain of mountains higher than any now known. The summits of these mountains alone have remained for our discovery; they constitute the innumerable islands of the Archipelago of Polynesia.”

THE DELUGE.

Not the least curious of the speculations which have lately been propounded across the water is one called “Cyclical Deluge; an Explication of the Chief Geological Phenomena of the Globe.” The theory is based upon the calculations of M. Adhemar, a French Mathematician, to whom the first suggestion of the really novel and striking idea that he has developed is due. With the figures we shall not trouble our readers, nor shall we guarantee that the theory is a true one; but, making a plain story in place of a difficult one, the line of explication is as follows:—

The earth, as it spins upon its axis, also swings or “wabbles” upon that axis precisely as a top rolls while its toe remains upon the same spot of ground. The top completes this circle in a second or two; but the terrestrial motion, caused by the sun’s attraction upon the equatorial protuberance of our planet, has a cycle of about twenty-one thousand years. During one half of this period, which is that known as the precession of the equinoxes, the North Pole will be more

exposed to the sun than the South Pole; during the other half, the South Pole will be more exposed than the North. At present, corresponding seasons are not of equal length in the northern and the southern hemispheres. The seasons of autumn and winter, in the southern hemisphere, are seven days longer than those of spring and summer. North of the equator the reverse is the case. We enjoy seven days more of sunlight during the year than falls upon the austral countries, but, in course of time, this advantage will return to the southern hemisphere, and we of the north shall be, for ten thousand five hundred years, or half of the period of equinoctial precession, left comparatively in the cold. In the year B.C. 1248, the North Pole attained its maximum summer duration of heat. But for the last three thousand years the heat has been decreasing, and the maximum winter duration of cold will be attained about the year 7382 of our era.

This much is an undeniable fact; but upon the fact M. Adhemar bases some startling conclusions. First, as to the cause and date of the great deluge which science and tradition agree in affirming to have swept over a large part of the earth not many thousand years ago. At the time of its occurrence the North Pole had been in comparative darkness for ten thousand five hundred years. During this immense period the excess of the hours of night over the hours of day had amounted to hundreds of years. This excessive cold had sufficed, little by little, to build up an immense cap or cupola of ice over and around the North Pole, which extended, if M. Ademar's calculations are correct, as far southward as the seventieth degree of north latitude. The attraction of this grand glacier had drawn into the northern hemisphere the larger parts of the seas and oceans of the earth—the northern continents were for the most part under water, and the marine shells which we now find upon the sides of mountains in the northern regions were then deposited for the

puzzling of geologists. The southern summits, on the contrary, were high and dry, and that hemisphere was then mainly terrestrial, as it is now mainly aqueous. An entirely different distribution of land and sea from the present one then existed throughout the globe. But the yearly sum of night hours in the northern hemisphere at last began to lessen, the sum of day hours to increase. The great cap of northern ice began to diminish, and a southern polar glacier to form.

After many centuries the sun's heat had sufficiently softened the North Polar ice to cause its sudden break-up. The slow process of terrestrial adjustment was instantly changed for a sudden and terrible cataclysm. The North Polar ice-mountain broke down under the influence of gravitation ; its fragments, borne upon the northern seas, rushed violently toward the south. Torn from his bed, the ocean bore with him the mud which now forms the diluvium of the northern hemisphere. Gigantic streams of water, mingled with earth, sand, and pebbles, formed the alluviums of the great valleys ; erratic boulders were carried southward upon the ice, and scattered all over the northern hemisphere, or piled upon the side of mountains that they were unable to scale, and left there for the corner-stones, as it were, of geological theories. a large part of the northern forests were torn up and borne away upon the flood, to be deposited in basins, and to become the coal beds of the present epoch. The waters of the deluge stripped the forest shores of Asiatic Russia, Nova Zembla, Lapland, Norway, and Denmark, pouring the floral spoil into the then estuary, which is now the North Sea, and distributing the fuel of the future in the great coal basins of the Firth of Forth in Scotland, and in those of Somersetshire and Gloucestershire in England. This view is confirmed in the opinion of Mr Walker, by the fact that Sweden, Norway, and Denmark, being probably without deposit basins at the coal period for the reception of the North

Polar timber rush, have not received an ounce of vegetable fuel, although these countries were within hail, as it were, of the Britain of the coal period. Were coal a deposit of vegetable growth *in situ*, we should expect to find its richest deposits in the eastern and other parts of the world where growth is the most luxuriant. Yet in these countries no coal is found.

Such was the last eyelid deluge. Its date is variously estimated at from two to three thousand years B.C. The estimate of M. Adhemar puts it at two thousand three hundred and thirty years B.C., a date which he considers to be not very far from the truth. According to him the next deluge will rush in a contrary direction to the last—*i.e.* from south to north; and it will repeat the phenomena of the deluge which occurred ten thousand five hundred years ago. Adhemar's deluge is to occur, unless unforeseen physical agencies shall accelerate or retard it, about six thousand three hundred years from the present time. Year by year, century by century, the cold in our hemisphere slowly increases as the North Pole is turned more and more away from the sun. That monster glacier, the ice-cap of the North Polar region, is slowly increasing in size, while the southern ice is slowly diminishing. The oceans, which are now accumulated mainly south of the Equator, are, in consequence of the increased attraction at the north, being drawn gradually across the equatorial line, thus producing an emergence of island continents in the southern, and an apparent subsidence of the land in the northern hemisphere. Thus it has long been observed that the sea is receding from the whole southern coast line of Australia. Lowlands, forests, fields, and shores, are submerged, as we see in the north. All these changes go on very gradually as long as the ice mountains remain unbroken. But at last the hour arrives when this regular and measured movement gives place to a sudden and vast perturbation of equilibrium. The Boreal, or northern

glacier, having reached its maximum extension, and the Austral, or southern glacier, its minimum, the latter becomes sufficiently loosened from the grip of its icy chains by the heat of the sun, and suddenly breaks up as the northern glacier broke up. The instant of its dissolution will sound the knell of a universal cataclysm. As soon as the fragments of the great southern ice mountains are shattered into icebergs, and begin to move away from the pole, the attraction of the northern glacial mass will become predominant. As a slight tipping of a shallow vessel filled with water will pour its entire contents to one side, so the shifting, however slight, of the earth's centre of gravity toward the northern hemisphere will drag after it, in a mighty torrent, almost the total mass of the waters. Their velocity will create a hurricane, accompanied, probably, by lightning, thunder, terrific earthquakes, and volcanic eruptions. The forests of the southern hemisphere will be stripped from the land and hurled into new coal beds. The countless islands of the Pacific will arise from the sea, and become the mountain tops of a new continent, to be covered with "eternal snows" until the next cyclical deluge shall submerge them. The Indian Archipelago will become another vast plateau of land, and its higher regions will be found as full of marine remains as those of the north are now observed to be. Australia will be joined to New Guinea, and thus acquire a new eastern seaboard one thousand two hundred miles long, between which and the present Australian coast will be a wide valley. Unknown lands will emerge from the abyss of the southern oceans. Even the "Antaretic continent," which Captain Wilkes claimed to have found in 1842, may then become a reality.

On the other hand the oceans will be suddenly poured across the Equator, if the present speculation be correct, and submerge the principal seats of modern civilisation. The northern hemisphere will become oceanic, as the southern will be again made habitable as before. Mr Walker thinks

that the same fate must happen to man as in that flood, except in the case of a few tribes, who may escape to the highest table lands and mountain ranges, upon which they may survive, only to fall, as the Pacific Islanders have done, into a state of gloomy barbarism.

In this dark picture however, the theorist has forgotten to make allowance for the power of science, and for the appliances of safety which man has discovered. We shall be able if worst comes to worst, to use balloons as well as steamships or transports, nor is it likely that any such cataclysm as is predicted in these speculations could come quite unforeseen upon the human race. If it occurs at all, it will find men forewarned; and an old proverb assures us that "to be forewarned is to be forearmed."

EARTH'S PROGRESS.

"The general law at the basis of all development is strikingly exhibited in the earth's physical progress. The life of anything whatever is the history of its passage from a general homogeneous condition to a special heterogeneous condition; a growing unlikeness among the parts. Primal simplicity, final diversity,—such is the law. The earth was first a featureless globe of fire, then had its oceans and dry land, and in course of time received mountains and rivers, and, finally, all those diversities of surface which now characterise it. Again, the climate began with universal tropics; gradually zones were apparent; and at last the diversity of the present day.

"The earth, in igneous fusion, had no more distinction of parts than a germ. Afterward, the continents, while still beneath the waters, began to take shape; then, as the seas deepened, the first dry land appeared, low, barren, and lifeless. Under slow intestine movements and the concurrent action of the enveloping waters, the dry land expanded, strata formed, and, as these processes went on, mountains by degrees arose. Finally, in the last stage of development, the Alps, Pyrenees,

and other heights received their majestic dimensions, and the continents were finished to their very borders.

“Again, as to the history of the fresh waters:—

“The first waters were all salt, and the oceans one, sweeping round the sphere in an almost unbroken tide. Fresh waters left their mark only in a rain-drop impression. Then the rising lands commenced to mark out the great seas, and the incipient continents were at times spread with fresh water marshes, into which rills were flowing from the slopes around. As the mountains enlarged, the rills changed to rivers, till at last, the rivers also were of majestic extent, and the continents were throughout covered with streams at work channelling mountains, spreading out plains, opening lines of communication, and distributing fertility everywhere.

“Again, the first climates were all tropical. But when mountains and streams were attaining their growth, a diversity of climate (essential to the full strength of the latter) was gradually evolved, until winter had settled about the poles as well as the earth’s loftier summits, leaving only a limited zone—and that with many variations—to perpetual summer.

“Thus the earth’s features and functions were successively individualised,—first, the more fundamental qualities being evolved, and finally, those myriad details in which its special characteristics, its magnificent perfection, largely consists.”—*Dana.*

THE ARGUMENT.

"Little by little, an acorn said
As it slowly rose from its mossy bed,
I'm improving every day,
Hidden deep in the earth away.

Little by little each day it grew;
Little by little it sipped the dew;
Downward it sent out a thread-like root,
Up in the air sprung a tiny shoot.

Day after day and year after year,
Little by little the leaves appear;
And the slender branches spread far and wide,
'Till the mighty oak is the forest pride.

Far down in the depths of dark blue sea,
An insect train worked ceaselessly;
Grain by grain they are building well,
Each one alone in his little cell.

Moment by moment, and day by day,
Never stopping to rest or to play;
Rock upon rock they are rearing high,
'Till they look out on the summer sky.

The gentle wind and the balmy air
Little by little bring verdure there;
'Till the summer sunbeams gaily smile
On the buds and flowers of the coral isle."

PART THIRD.

YOUTH AND MATURITY.

LIFE : THE STAR OF EMPIRE.

CHAPTER IV.

MYSTERY OF LIFE AND HISTORY OF LIFE.

The genuine origin of life and the provisional end of life.—Our badly understood body is but the starry heavens in a pocket edition.

ANY of the modern works of natural history give an account of the discovery of the new element, Protoplasm, a substance so important as to take its place as a new kingdom in nature. There have been ships fitted out, as you know, expressly for the purpose of scientific research, and the greatest reservoir of all curious and unknown things, the sea, has been the chief field to which attention has been directed.

At the very bottom of the Atlantic, 2500 feet below the surface, when the cold and pressure and darkness is greatest, the dredging nets have brought up a curious and unknown liquid. What class of substance could it belong to? it was like nothing ever known; like neither water, earth, or air; it belonged to neither animal, vegetable, or mineral kingdoms. There is something new under the sun. Not a trivial thing, but the greatest possible,—a new natural kingdom.

Far away in the bottom of the deep blue sea there exists an element which our grandfathers never dreamed of—an element which is neither water, earth, or air—which possesses properties of neither animal, vegetable, or mineral, but has strange and startling properties of its own.

A new kingdom has been found in nature. This element, if our ancestors had known it, would not have interested them; they would have called it *slime*, and to appreciate such a thing as slime, or find any satisfaction in its observation, requires a scientific taste, which has only been possible to man

within the present century. This new substance has been studied with great care by naturalists, who have given it the name of Plasma, Protoplasm, or egg-white substance. There are vast beds of it in the Atlantic ocean, down where the telegraph cable lies.

Let us trace the metamorphoses of this new element: this thin greyish white plasma, being matter, is subject to the universal law of condensation, the same as all other matter; if we could examine a small portion of it under a microscope, we should observe transformations in it analogous to those which must have occurred in the ether at the great beginning of the solar and other systems—a small light speck first appearing, vague, indefinite; others appear like it; they are like the cloudy nebulae which were the germs of the stars. Examine one of these little plasmic nebulae; it has the same vague indeterminate outline, the same vacillating, unsteady motion as a stellar nebula. Condensation is going on, a nucleus is formed, the centripetal and centrifugal forces begin their work. The molecules turn round this nucleus in a whirlpool,—tighter and tighter they are drawn, until they are massed in the shape that will contain most of them in smallest compass. The beautiful sphere! If condensation increases, there must be fracture; will it now become an ellipsoid, and throw off a ring as the sun did in its condensation? That something analogous occurs, we may be certain, for in the next act we see, instead of the sphere, like the early stellar sphere, there is a system of globules, as the present solar systems is a collection of globes. Condensation continues; upon each of these liquid globules a solid crust is formed, as a crust was formed on the liquid and condensing earth and other planets.

Here is a discovery: when the great mechanical forces of nature operate on a large scale upon crude masses of all sorts of matter, the result is planets; when these same mechanical forces operate on the small and select portions of matter

which make up protoplasm, the result is these little globules or cells ; and as those great globes, suns and planets, are united together to form an ellipsoid shape,—a solar system,—these globules unite into an ellipsoid, which could be, with the same truth, called a cellular system ; and we may study the motions of these globules in the protoplasm, as we study the stars in the ether.

If we watch such a system, we may see its globules moving around each other for a while, the motion gradually diminishing and the globules grow harder and finally seem to stick together, and then comes a complete equilibrium ; the system is motionless, and then there is dissolution ; its molecules, are expanded, not into plasma again, but into invisible gas ; the system vanishes into the air. Sometimes, however, they do not thus decompose, being preserved by petrification ; the pyramids of Egypt are made of stone composed of these dead protoplasmic globules. We may now realise the importance of this new kingdom ; a new field is opened up to students, a new science is born,—a science greater than geology, botany, or mineralogy,—a science equalled only by the science of the heavens.*—The stars and the cells, the telescope and microscope, man's two noblest instruments to study nature's two noblest productions.

The study of the new science has settled the famous spontaneous generation controversy,—indeed it has shown how idle such a discussion must be ; by the knowledge now gained, the two furious combatants are seen in a light that is almost ludicrous. Can the chemist produce life ? and by life most people do not mean a low kind of life, but a man, or at least an insect. No ! Do insects spring spontaneously from “boiled decoctions of hay and beef tea” ? No ! Can life be produced out of “dead matter,” without germ or seed ? Yes ! It is produced to-day from the dead (?) atoms of oxygen and carbon,

* Protistology, Plastidology, or Histology.

and has been every day for the last hundred million years. Why can not the chemist produce it? Because he can not supply the necessary complex conditions ; darkness, temperature, and a pressure of three miles depth of salt water.

THE MYSTERY OF DEATH.

“ When thoughts
Of the last bitter hour come like a blight
Over thy spirit, and sad images
Of the stern agony, and shroud, and pall,
And breathless darkness and the narrow house
Make thee to shudder and grow sick at heart ;
Go forth, under the open sky, and list
To nature’s teachings, while from all around
Earth and her nature, and the depths of air,
Comes a still voice.”

Let us now pause a moment before going into detail, and take a general view. Let us see if here it is possible to throw out a conjecture as to what life really is.

Turning to the example of a row of bricks on end, in which motion being applied to the first one, is continued along the line, it may be shown that the action of which life consists is similar. Protoplasm is built up of tall or massive columns of oxygen, hydrogen, &c., exceedingly unstable, composed of a large number of units, which are made of molecules, which are made of atoms ; the undulating motion which protoplasm in common with fire displays, is evidently the fall of the columns ; the heat which this also, in common with fire no less than with all life, exhibits, is the breaking up of the units into molecules, while the separation of these into atoms is the chemical motion or thought,—of which I shall speak later.

Protoplasm, then, resembles a fire,—a sort of wet fire,—only the units being piled up very high, it shows more visible motion and not so much heat. Is life, then, a fire—a slow combustion? The substance of our bodies, as the physiologists tell us, is being actually consumed with every breath

we draw. The heat of our bodies is an actual fire, why then is the organism not consumed? Because its substance is constantly renewed. Is it this mysterious renewal that constitutes life? Is life a fire self-fed? All fire feeds itself with oxygen. It is often observed in gigantic conflagrations, like that of Chicago, when the fire, being in large mass, acquires great power, that the flames and the buildings seem to leap into each others embrace. Is life nothing after all but a kind of fire? Life fire—impossible! the thought is absurd. Does the conflagration of a city constitute its life? Does the burning of the wood in our fires constitute the life of vegetation? A light breaks in upon us. Fire is not life, but death,—the end of all things. Instead of life being a kind of fire, we now see that all fire is actually the concluding portion of the life; whether in the form of conflagration or decay, it is the winding up of the vital process. In all fire we see the end of some life or other,—the closing act of life's drama.

What next? Thus far, certainly, we have been singularly unfortunate. The brilliant animal mechanism whose secret of action we were about to disclose has ended in smoke.

Let us not be discouraged: though life has thus disappeared from our sight, it cannot yet be lost; *matter is indestructable, force persistent*. What has become of our animal of which we have lost the trace? It is not destroyed, but has vanished into air; if we analyse the air we shall find all the elements intact. Here is another discovery—fire is the “last act of life,” but air is the next act.

This is the way in which the process strikes the popular mind.

AN AWFUL FATE.

“The scientists will yet drive us all distracted. They show that all substances exist in the form of either solids, liquids, vapours, or gases; that by increase of heat alone, the solid is changed to a liquid, the liquid to a vapour, and the vapour to a gas; and that the increase of heat, or such change

from solids, clear through the scale up to gases, consists simply of a more rapid vibration of the atoms of the substances themselves.

"These truths may seem very harmless when clothed in the cold and unemotional language of science, but just consider the matter practically. Here is a man who is a solid substance, and has no idea of ever becoming even a liquid, much less a vapour or a gas. But the atoms—mind you, the *atoms*—of which his solid substance is composed, get to vibrating more rapidly than is consistent with a solid state, and straightway he may become a liquid, and be carried off in a pail. As a symptom of the initial workings of the atomic vibration which is thus to transform our substance, what terrors copious perspiration may hereafter strike to our souls!

"There are degrees in the terror which these truths inspire. To be melted into a liquid would be bad enough; but to be transformed into a vapour, or sublimated into a gas, would be intolerable. Of course, if one's atomical vibrations reduce him to a liquid, his personal interest in his physical condition may be supposed to cease, but his sympathetic relatives may still have some regard for his remains, which, as a liquid, could be preserved, or even buried with due honours. But the perverse atomic vibration goes on still more rapidly, and the disconsolate mourners see their lamented friend passing off, in the form of vapour, beyond the possibility of becoming mortuary attentions. This would be grievous enough, but the transformation does not stop even here. The atoms vibrate still more furiously, the vapour itself fades from sight, and the defunct, passing off into invisible gas, disappears from the domain of the mortal senses, with no possibility even of marking his last resting place. In fact, what last resting place could there be for a gas?"—*Ledger*.

Such is the poetry of death. I will now show you how marvellously it corresponds, as all true poetry does, to the stubborn facts. Science is declared by theologians, to be the

handmaid of religion, and many who are not theologians hold, and with a strong show of reason, that art at least is her servant. Let us say, rather, that art and religion are one; an intuition, a feeling, a divine inspiration, and that this inspiration is the advance guard of the corps of civilisation, while science forms the centre. Science following in the track of art makes the path clearer, and it also makes it wider.

Long before science was heard of, the old Greeks, who were a nation of artists, burnt the bodies of their dead, and they pictured the immortal spirit rising from the flames into the air; and from that day to this, all poetry and all religion is impregnated with the idea of the bright invisible spirit—the bright denizen of air—the ethereal formless essence unseen by mortal eyes.

What a new depth of meaning have all these ideas in the light of modern science, which shows us, first, that fire is the invariable accompaniment, nay, the very act and essence of death—that sooner or later we must pass the fiery ordeal; and secondly, that our spirits become not only like the air, but the air itself.

This is the path broken by the Art pioneers, deepened by the slow, sure, and heavy tread of Science. Now for the widening which this latter day leader necessitates.

There are other acts in this drama; let us use our eyes a little. Observation shows us that life in its most prominent features is neither the igneous nor the aeriform gas which I have spoken of, but a liquid; absolutely liquid, in the blood, which is the life—a coagulated liquid in protoplasm, and in later forms of animal life growing to be a running or flowing solid, then denser and denser, until finally caught by the fire and dissolved into gas; such, physically, is the history of every organism. Note, secondly, that the beginning of life is always in water. At the bottom of the vasty deep lie the beds of plasma; and only from the substance of this “salt” liquid itself can life arise. *Water seems to be in some mysterious way connected with the beginning of life as fire is with its end.*

Note, next, the fact taught by geology, that the aeriform envelope of the earth, the air, by its condensation formed the ocean; that *the air is ever thus condensing into ocean—water—* and must ever continue to do so as the cooling of the earth's surface and as gravitation continue. The air, the ocean, and the vast scattered mass of blood and flesh running "alive" over the earth's surface, are in reality all three the same—they are merely three different states of the same biologic matter; gaseous, liquid, and solid or semi-solid—air, ocean, and plasma are one; precisely as steam, water, and ice are one. The transformation from one of these states into the other is the picture which I wish to present to you.

AIR TURNS TO WATER, WATER INTO ANIMALS, ANIMALS BECOME
AIR AGAIN.

Let us climb to the top of the Himalayas and take a bird's-eye view of the earth we live on. The great difference in human success depends on the different capacities for taking a bird's-eye view of things. We have already mounted to Alcyone to view the rising universe; this smaller, terrestrial prospect, then, will not injure our eyes. Look! below us lies an ocean—the ocean of air; invisible, pure, though the reservoir of all impurities; all earth is bathed in its depths. Below it there is the briny ocean, another great reservoir containing all the elements of the universe. Can you see a third ocean. You will have to strain your bird's eye, accustomed to view only the concrete side of things, to the utmost; there is another, whose currents are not so swift as the gaseous winds, nor as mighty as the liquid tides, yet more subtle than either. This is the biological ocean; it has its beginnings at the bottom of the other, the sea; it bubbles up in brown and green and finny streams, and flows from pole to pole; it stands in grassy seas and leafy lakes over broad continents; it mounts in branching pillars, more curious than the icebergs, while its more tumultuous waves dash through our city streets, and

others rise and sail in the air as the waves of the other ocean sail in the form of clouds for a time and sink again. Are there any more oceans? Yes, close above and over all this ocean of life is spread the immaterial ocean of fire or decay. "In the midst of life we are in death." Not a rose that blooms whose petals are not hourly decomposing; in all our tissues there is daily waste scattered through our furnaces—spread broadcast over our plains and forests; in the decaying wood, grass, leaf, and animal, there is not a spot on earth that is not washed by its waves.

Where do these waves carry us? Once again into the regions of air; we have reached our starting point—we have been moving in a circle. Follow the road once more:

The light irrespirable air around our heads on the mountain-top, five miles below us at the mountain's base, solid and heavy-laden is condensing into liquid—is becoming the sea. Five miles again further down below its surface, in the cold and darkness and awful pressure, the sea is condensing into an ocean of plasma, whose currents flow up and on over the broad surface of continents, assuming strange forms according to circumstances, animal or tree, as molten metal, cooling, shapes itself. Finally, when cooling and condensation has reached its limits, this scattered ocean is being transformed into another, one of flame, and thus rarefied into air—that sea of immortality.

The "briny deep" is liquefied air. Life, that snarled swarm of flesh and grass, is precipitated brine—precipitated sea water. Air is vaporised life.

In other words, the air is slowly condensing and turning into water; water is slowly hardening, that is, turning into plasma, that is, "flesh and grass," while these last are slowly melting into air. Is *immortality*, then, but life in the melting-pot, and is Bryant's *Thanatopsis* the true philosophy of the future state? If we give immortality the classical signification, *i.e.*, eternal life, I see no other conclusion. If we use the term in the modern sense, meaning permanence, imperisha-

bility, something that abides amid all changes (which "*life*" certainly does not), we are led to views diametrically opposite. I am not, however, discussing the question of immortality, but simply that of terrestrial life.

Life is not a drama, having its acts, its beginning and its end; life is a circle—a ceaselessly revolving wheel whose four segments are water, plasma, fire, and air. The explanation of life, said the old poets, lay in the four elements, fire, water, &c., and they were nearly right; two thousand years have passed, and all the work of science confirms inspiration.

WHEELS WITHIN WHEELS.

The group of changes I have described may be termed the cycle of life. There is another greater set of changes which I have once or twice mentioned. At the beginning of the galaxy, the expanse of ether gradually through long ages transformed itself into the world of stars. Observation points out what will be the end of this starry world; the image of that *cold black mass* inevitably rises before us. Will this be the end? No; the *fire* in this case likewise will assume its sway; there will come a great crash, and the heavens will be on fire—the stellar world will again become an ocean of ether. Evolution and Dissolution are the revolving of the greater wheel, in which we see successively the segments—ether, nebulae, stars, planets, dead masses, fire.

That other endless cycle, the cycle of life, is but a repetition on a smaller scale of the cycle of the universe; macrocosm and microcosm, a wheel within a wheel, where the same spokes turn both rims—as the government of the state, with its senate and house, is an internal counterpart of the government of the nation.

The most wonderful part of it all is, that man, while playing his rôle in this miniature performance of life, as well as in the greater one of the universe, is enabled to comprehend and compare the two, making the lines of one do duty for those of

the other where they are indistinct or blurred, and *vice versa*. Thus, learning both thoroughly, he may act well his part.

THE WHOLE WORLD KIN!!!

THE MOST REMARKABLE TREE KNOWN—THE GENEALOGICAL—THE FAMILY RECORD—GENEALOGY OF MOTHER EARTH'S FAMILY—EXPANDING OUR SYMPATHIES AND EXPANDING THE ALMANAC—THE SIX AGES OF MAN (NOT SHAKSPEARE'S)—DESCENT OF REPTILES, BIRDS, BEASTS—PLANTS ARE ANIMALS THAT HAVE TAKEN ROOT—"COMETH UP AS A FLOWER."

No Particular Difference between a Man and a Violet—Proofs of a Brotherhood—Analogy of the Peacock's Plumage and the Smiles of Woman—Other Curious Revelations—Botany the True Study for Politicians and Moralists—The entire Book Epitomised in this Section.

WHY is the condition of the ocean of *plasma* unlike its preceding and succeeding conditions, *water* and *air*, divided and split up into the divergent streams of life, instead of being in a continuous whole? Why are these streams or forms of life so infinitely varied, and how shall we reconcile these divisions with the statement that life, like an ocean, is one?

The consideration of that fine object in nature, a tree, will help us to reply to these questions. A tree is in some respects the type of all life; for that too is branched, and the branches are highly diversified, and yet we are accustomed to speak of the tree as a unity—as one.

How does a tree grow? We see it first a single round shoot, but we know that this unique form will not continue—that we cannot expect to see a beautiful green stump a hundred feet high and several feet thick, like an overgrown asparagus head; if this were the case, we might equally expect to see the deep sea protoplasm growing up into a vast living mountain, instead of branching off into fishes and reptiles and beasts and insects. Let us look into this tree-growth a little, and see if we can understand the process; again, how does a tree

grow? Upon the top of the primary shoot above mentioned several buds appear; these buds are built up from the cast off cells of the shoot, and they at first assume the form of the original seed; they increase in size, and each bud becomes a shoot like the parent stem, which now dies; then new shoots each become parents, and die; only the bark and sap channels remain, through which each new generation draws its nourishment. The real life of a tree, then, is only in its twigs; these are the living species; the body and branches are but a collection of the myriad corpses of past generations, massed together and awaiting the fire, which, in many a mighty oak is already kindled at its centre.

This perpetual genesis, then, which, like all genesis, is the necessary sequence of the escape from the organism of unbroken units, is the cause of the branching, the continual division and re-division of the flowing stream, the vegetable plasma, composing the tree; the life of the children is at the expense of that of the parent, but as each child is really a little portion of that parent, the current is, in reality, unbroken; the farthest twig of the wide spread oak shows, by its form, that the blood which animates it is but a continuation of the same stream that nourished the first sprout.

Animal life differs from that of the tree, or to speak accurately, the life of a race of animals differs from this race of vegetable twigs, which the tree is—inasmuch as that the dead individuals are immediately burned up, instead of being massed together and preserved. *The species of animals we see on the earth are the twigs of the great animal tree, the body and branches of which have long since perished.* Yet there must be in the veins of each of these a portion of the same life current that fed the first animal—the parent stem; and thus we are led to see the remarkable truth: there is no death, for the children are but a continuation of the parent. Life is a great whole, a vast stream, a wide-spreading tree everlastingly sprouting. When we speak of life we do not mean these

twigs—the individuals themselves—but the perpetual current that animates them. I mean that ceaseless stream of blood, plasma, or life, which ever flows on and abides, while the organisms that it nourishes perish.

To follow the course of this stream from its fountain head through all its thousand windings and branchings throughout the ages, to reconstruct the great animal tree of which we living creatures are the twigs, this is to study and to learn what is life.

In reply to the obvious question as to why these branches of the family tree present externally, though only externally, such a variety of appearances, I have to refer you to the laws of adaptation ; the law that diverse conditions of life inevitably cause divergence of character. If we compare the conditions of two sprigs from the oak, we find that they are in all respects similar ; if the environment of two sprigs from the animal tree be compared—the water and air of the fish and the bird—we can see how impossible it would be for these two branches to be alike. Another question that would arise would be, what is proof, the actual visible proof, that all these creatures have this common origin ? When it is asserted that such diverse things as a fish and a bird are both chips of the old block, there ought to be strong grounds for the assertion. Such ground is found, not by the mere childish looking at the concrete outer appearance, but by comparison of the internal structure. That wonderful back-bone, which alike pervades all, is enough in itself to declare relationship. Could a thousand animals, by mere chance, have produced in their growth such a coincidence ? Note, secondly, that we see every day that all animals *do* spring from the same thing, a simple cell ; that they all commence life exactly after the same fashion, and that it is only after they have gained considerable age in their development that they begin to diverge. Note, thirdly, that in geological strata are found many of these dead ancestors which can be claimed by one animal as much as by

another—as both Americans and British subjects might claim Alfred and Horsa as their fathers ; even so the Protosaurian is as much the father of the turkey as of the erocodile ; it must have possessed, in a erude way, the rudiments of all the qualities of both. Space will not allow me to dilate ; all the reeent works of the anatomist, embryologist, and the geologist, unite in a weight of testimony too great for denial. The discussions of seientifie men are no longer *per* and *contra* on this question, but only as to the *process*, and by what *laws* the great animal family has grown to its present marvellous proportions ; and the next arduous task will be to construet the—

GREAT GENEALOGICAL TREE,

For “One touch of Nature makes the whole world kin.”

There are several ways of testing the nearness of relationship. First, by general comparison. It is plain that the cat and the lion belong to the same family, as do the dog and the wolf ; so, farther down in the scale, the five fingers of the eat, the beast, and the reptile, indiate a similar but more distant relationship ; while the mutual back-bone, before referred to, still further points to a eommon aneestor ; and so we may trace down still lower the points of resemblancee, down to the bosom of our mother earth. Insects are more distantly related to us, crystals not at all, and plants but little, only “through Adam,” as the saying is—that is, only through our earliest aneestors, the Protoplasta.

The family tree is thus traced downward to its roots, which are imbedded in the protoplasm ; we may dig deeper if we wish, however, and before beginning to climb, we will get a still broader basis—one that shall include the inorganic as well as the organic branches, for there is really, as I have remarked, no difference between that thing which has life and the thing which has not. Let us begin, then, with the deadeest substance in the world, if we can find it—that which has least motion and least form. All liquids tend to assume shape ; taste is a

kind of motion, so is smell and colour; if, then, we can find a colourless, tasteless, and formless powder for a matrix, it will be what we ask. Such is the soot from our chimneys, and this shall be the trunk of our tree. What is the first and lowest branch? Let us compress this soot into charcoal; compress still further it grows to bitumen, anthracite, and Kennel coal,—it is beginning to exhibit *form*; continue the pressure, it is changing; as graphite next and as jet, it has lustre and taste; another stroke of condensation, and presto, the diamond, the most exquisite form on earth, flashing in the sunbeam every colour of the rainbow.

Thus ends the first limbs—the coal, bitumen, black lead, and jet branch, tipped with a diamond flower. Let us now ascend the main trunk; but first it may be observed that there are other trees in nature besides the carbon tree; there is one arising from the plain brown powder, silicon. From this there grows a lead-grey table or leaf, and then a crystal, with which only the diamond can vie; branching in another direction, admixture and union in larger masses gives granite; and further up, the crystals are overborne by the weight, and we see a gummy, glue-like substance—flint—rather a hard gum, but a gum nevertheless; these are forms of it almost as curious as plasma.

Examine now the analogous transformations in carbon. Let us pile on the atoms; with lime, we have marble; with an alkali—soda—a salt; form is being sacrificed, motion is increasing; we have colour, taste, and smell; ammonia and smelling salts, strong odour, and a greasy feeling; add water to it, and it is protoplasm.

This is the dynamic or mobile division of the tree, far larger and more interesting than the fixed or crystalline. Protoplasm does not crystallise in the ordinary sense of the word; it has a tendency to build up cones and double cones and cylinders, instead of true cubes, pyramids, and prisms. Nearly all the organs of the body are cones or double cones.

There is no radical difference here, however ; cut off the corners from pyramids and prisms, and cones and cylinders are the result. Cube, pyramid, and prism sum up the forms of both organic and inorganic world.

A remarkable property of protoplasm must here be noted. It is porous ; its strong attractions draw hard earthy matters to it, and they pass through the pores and form deposits—on the outside, bark or shell, on the inside, bone. These structures are mere dead matter that plasma has passed through its hands, and consequently given it its own impress, as though formed by a mould either inside or out.

The lowest of creatures, the protist, thus leaves encrusted cells as monuments of itself.

Many of these united together make a beautiful spiral shell filled with little chambers, and these are aggregated together into nothing less than mountains ; the Egyptian Pyramids are built of the rock of such shell.

So much for what protoplasm can do, and here is life without organisation ; the protoplasm is structureless ooze or slime.

Turn attention to another appearance—to the same slime under different conditions ; it covers all pools of stagnant water in the summer ; under the influence of the bright sunlight, it turns green, and separates into long delicate shreds ; do not despise this green slime, it is very beautiful. It is a forest in miniature ; examined under a microscope, it is found to be higher than the protoplasm, inasmuch as it exhibits cells. From neutral protoplasm it has become vegetable plasma, and the little cells, by continued aggregations, gradually build up the great plant world. From these shreds it is but a step to the bright red sea-moss that adorns every lady's album. A heavier, stronger plant is the ordinary green sea-weed upon the bottom of the ocean—sea grass. A higher development is the great brown alga of the deep sea ; this grows to be the longest of all vegetables—off the coast of California reaches the length of four hundred feet ; and Pro-

fessor Agasiz, in his recent voyage, formed the acquaintance of a few of these monsters who boasted nearly a thousand.

Now let the sea moss get on land ; with these changed conditions it grows to be liver moss, a coarse and rude kind of plant, possessing neither root, or leaf, or branches. This vague, liver-like vegetation becomes club moss, a fern covered with scales, which fern, on the one hand, increases to a sort of leaf—the ordinary fern ; on the other hand, when the shaft grows and the scales become atrophied, we have rushes. Take again the scaly club moss ; branching in another direction, can it make anything else ? Yes, examine that pine tree yonder, it is very like the club moss—an over-grown moss, and not a tree, properly speaking ; the sago tree and the “evergreens” are different from all other trees. Once more, the scale moss grows in a different fashion ; the scales increase, some curl up, and a cylinder is the result ; grass, grain, lilies appear ; on the other hand, here, for the first time, leaves, and finally, flowers make up the acme of the vegetable world.

Thus much for the vegetable branch of the genealogical tree ; there are two more vast limbs which separate from each other, a little higher up ; to climb them we must begin with stepping-stones, as humble as the very worthless worms of the dust, which, in classical phraseology, men are said to be. Worms, then, are one theme. Note, that one of these is like a sack, the other a jointed cylinder. These *joints* are the sign of precocity, which is ever fatal to a high grade of development, and the posterity of this creature will never become great ; it will become the bright ephemera, whose wings reflect the rainbow tints.

Thus the charcoal becomes diamond ; the worm the insect ; the caterpillar the butterfly.

In a hundred million years, this poor worm has become the insect world.

Closely allied to the other ancestral type, the sack-worm, we find a very eel-like sort of fish, and next, the Triton and

the Siren, from which, as a common progenitor, there are two important streams ; the one the reptiles, and their descendants the birds, with their long serpent necks and poisonous glow. The other branch is the highest and most important of the tree ; and its three chief divisions, the *Hoofed Animals*, the *Carnivores*, and the *Simiads*, the highest types, the summit of creation ; these offer the grand fields of study for the psychologist.*

Let us turn now from the *pictorial* contemplation of this *Arbor Vitæ* to follow its *growth*, as we might trace the course of the acorn until it became the forest monarch. We have now to take into account that new element that plays the star part in this nineteenth century, viz., *Time* ; this is the new scientific weapon which shall unfold to us all the secrets that the scalpel has failed to reveal.

UNIVERSAL HISTORY.

History, or the course of time, like all other things, must be regarded as made up by the aggregation of units ; thus, seconds form minutes, and years *centuries* ; and what is called a historic *period*—*e.g.*, the Mediæval Period, the Græco-Roman Period, &c.—usually comprises several of these. Periods again form an *Epoch*, as the Semitic Epoch, the Indo-European Epoch, the Glacial Epoch, the Carboniferous Epoch. Next, several of these Epochs compose a Great Geological *Age*, of which six have been studied by naturalists, and partially described, and these, considered together, constitute one of the *Grand Divisions* of History ; three or four of which, again, complete the *Cycle*—the cycle of the Evolution and Dissolution of the Stellar Universe.

The longest period of time, then, of which the mind can form a rational conception, is from the so-called beginning of the universe, that is, the time past, when the matter composing our galaxy was at its greatest expansion, to the time

* See frontispiece.

future, when by explosion, fusion, or percussion, it shall again be reduced to a similar state.

This long period may be divided into four grand divisions, the first extending from the commencement of condensation to the birth of our planet; the second comprising the time occupied in the growth and formation of the earth; the third being that of the earth's maturity, coeval with animal and vegetable life; the fourth division, that in which the earth, sun, &c., will be in the present condition of the moon, *i.e.*, dead and awaiting dissolution. These grand divisions might be appropriately named after the four successive orders of nature, *Aer, Aqua, Vita, Petra*.* Birth, Growth, Maturity, Death.

It is with the third of these, *Vita*, that we need now particularly concern ourselves. The division beginning at the point where the earth became cool enough for oxygen, &c., to condense into the cell, and ending at the point where it will become too cold to sustain life. This division occupies not less than a hundred million years, and is divided into six ages, which I will here briefly characterise.

AGE OF THE ACRANIA (HEADLESS).

Duration not less than fifty million years; land and water pretty generally mingled. Life—seaweeds, and “worms,” “headless and heartless.”

AGE OF THE FISHES.

The age of the ferns and the fishes—duration not less than thirty million years. The certain proof that these are the descendants of the Acrania and the Algæ, is that only such are found in lower strata.

The earth during this age, presented the appearance of an archipelago.

AGE OF THE REPTILIA.

Duration eleven million years. Land mostly in southern

* The periods of the generation, integration, differentiation, and concretion of this planet.

hemisphere ; life—pines and palms, and the reptilia, dragons, sea-serpents, &c. The certain proof that these were gradually developed from lower forms, is that only such are found in earlier strata.

AGE OF THE QUADRUPEDS.

Duration ten and a half million years. Climate colder ; land in northern hemisphere ; first appearance of foliage and of “beasts.”

ANTHROPOLOGICAL AGE.

The age of bipeds ; rapid development and predominance of the human animal over others ; societies of bees and ants, but no higher ones. Flowers acquire their colour and odours. Duration half a million years.

PSYCHOLOGICAL AGE.

The age of ideas, from the beginning of human societies to the period of their highest development. The chief terrestrial features of this age are cities and cultivated vegetation. That portion of the age already past may be divided into the periods of antiquity and of modern times—(*Rome, London*).

SYNOPSIS OF THE THIRD GRAND DIVISION OF HISTORY ;—EARTH'S MATURITY.

THE SIX AGES OF LIFE.

I.

THE ACRANIAN AGE.

Age of the vermes and the seaweeds.

(Laurentian, cambrian, silurian epochs.)

Duration—Fifty million years.

II.

THE PICIAN AGE.

Reign of the fishes and the ferns.
(Devonian, carboniferous, permian epochs.)
Duration—Thirty million years.

III.

THE REPTILIAN AGE.

The reptiles and the "evergreens."
(Triassic, jurassic, and cretaceous.)
Duration—Eleven million years.

IV.

MAMMALIAN AGE.

"Beasts and their forests."
(Eocene, meocene, pleocene epochs.)
Duration—Two million years.

V.

ANTHROPOLOGICAL AGE.

Rise of the bipeds.
(Epochs, glacial and post-glacial.)
Duration—Half a million years.

VI.

PSYCHOLOGICAL AGE.

"Men and their cities."
(Predominance of nerve over muscular force.)

Let us take a rapid survey of the course of history through these ages. I shall traverse the time with seven-leagued boots. For each word of the history you may safely count several millions of years; do not be surprised, then, at the transformations, for TIME WORKS WONDERS, and this is to be remembered above all truths.

In the earliest age, the good old time, the goodest and oldest of all times, the world must have presented a simplicity quite enticing to lovers of that quality; save a few granite crags covered with lichens, sea and land were one, and amid the hot *mélange* there was a wilderness of tangled half-formed leaves, mingled with vast beds of protoplasm and slow-moving worms of a thousand shapes, while the genial sponge and the screne polyp were masters of the situation. But changes are coming, earthly matter gravitates to its granite centre; and upon the islands thus formed, the wild sea weeds find a footing; and they strengthen and toss their heads high in air, and multiply until there is nothing left to feed on, and then comes wholesale death by famine, and their remains we are now burning in our grates. Among all the animal forms, those of the oblong shape, and those races the individuals of which, at the anterior extremity, have grown keenly sensitive to the sun's bright rays—those which by sharp discipline have learned to utilise for locomotion the rough branches that prodigal nature has permitted to sprout from their sides—predominate.

And as time wears on, other modifications of the fortunate race occur; as in their ancestors, the food which at first was drawn in on all sides alike, has at last forced a passage; so here the blood, first found equally in all parts, by constant passage carves definite channels, and a slight accidental habit of contraction in a portion of the passage, becomes in time exaggerated into a great beat. Currents of motion, too, become addicted to certain channels, for motion must ever follow where there is least resistance, and when once it has broken through, it is easy to repeat, and nerves are the final result. And as the passage is not always perfect, but more motion often communicated than can be conducted, it creates for itself a storehouse, a reservoir of force—the brain.

Day after day, and age after age, the progressive race waged war upon the already thickly populated earth; and the eye grew sharper, the limbs swifter, and the brain larger. They

are the masters. Then came competition, diversity; some grew large and slow, others quick and swift, and every foot of water was filled; thousands were crowded out upon the muddy shore, and for centuries they lay in the soft mud, writhing, dying, and preying upon each other.

Yet still they multiplied. On the land there were worms and insects; it was a last resort for the famishing race; there was a dash at the rocks, and those who were longest-winded and could wriggle the hardest succeeded best. But it was a fearful time for the little fishes; if they ventured into their old haunts, they found no food and were devoured by monsters. They formed a habit of swallowing air; fins, no longer used, sank soft and lifeless at their sides; generation after generation this continued, until gradually the useless fins were once more employed to propel them along on land, while the bladders of air in their throats, by sure selection of the best, became lungs.

Being fairly accustomed to their new element, we find their condition vastly improved. The tender plants offer tempting inducements; earth is covered with worms, which, unmolested for a million years, have grown to fat and inviting proportions. On roll the ages, and our little fishes, whom we have followed with interest through their adversity, became hideous lazy monsters; only too happy to escape from the trouble of swimming, too lazy to think of running, they gradually built up a race of the most magnificent *crawlers* the world has ever seen—crocodiles, dragons.

Population increasing, wars are constant, and the reptiles prey on each other; the smaller tribes are quickly swallowed up, except a few of the hardest—a few tortoise tribes, which, by thus continually losing the tenderest among their number, acquire a horny shell that bids defiance to all enemies.

And thus such atrocious creatures became masters of our planet. And their numbers increase, increase, increase! till there is scarcely a foot of land not covered. The inevitable

result following—death, terrible struggles ; they eat each other, and the smaller tribes are again driven to desperation, and vainly seek to escape by training themselves to leap into the air ; yet among all the myriads born throughout the millions of years, a few families there are gifted with scales of a lighter nature than the others ; and as death thins year by year their ranks, it always takes the heavier ; if you could have examined the growing scales of each new-born you might have told whether it would be likely to reach maturity, for upon their fleeciness and ability to catch the breeze depends their safety. Roll on the ages, and see, the large mouth has grown delicate, active pursuit shortens the eye, and the exertion of sustaining themselves ever in the air has created a nervous activity incredible. You would not recognise the race, for it is changed in appearance until it is the very antithesis of its ancestors. Yet internal structure shows still the common origin and close relationship, and in the strangely serpent necks, and dull brains, and horny feet and mouth of all the feathered tribes, is seen the reptile's trace, for "blood will tell."

The growth of the aerian race, however, affects not a bit the condition of the old monsters who grow daily more hideous, and forty, fifty, and sixty feet in length. Any text-book of geology will show how they looked ; but the day of reckoning is at hand. Who would recognise in these fellows the agile siren of earlier ages ? who in Nero, Brutus ?

Thus Reptilia "runs the usual course ; virtue and truth produced strength, strength dominion, dominion riches, and riches luxury, luxury weakness and collapse ; fatal sequence," all of which means, that when a race is in perfect harmony with its environment, and that environment changes, they are liable to perish ; the sudden change of circumstances kills them. And here is the best possible example of history. Our race of Neros were fitted for a sunny clime, how will they bear the coming frost ? Accustomed as these old conservatives are to seeing mere gross mass control the destiny of

nations, how will they ever bear the unexpected attack of progressive species with their lightning feet and claws of steel? there will be indeed fatal collapse of the Reptilian Empire.

Let us turn now to other lands; those species who travelled furthest from their old home, the sea, slowly built up a new life and a new power, destined to revolutionise the earth. Driven far inland, and among the cold mountains, the struggle was chiefly with the rough inclemencies of nature. Few were the survivors, and these such as were endowed with a tendency to warmer blood and the production of an external covering. The young no longer survived when left in the egg, and this fact wrought changes—the double heart, hair, a marsupial pouch, &c., and having by these devices assured their footing in life, these races grew and multiplied exceedingly, so that a tremendous tide of emigration quickly set in. And now began a war of extermination. No words can portray the hatred felt by the new comers, who had an eye for beauty and for love, towards their lazy and ugly old progenitors; and the doom of the latter is sealed, and a new era dawns upon the earth. With the gradual growth of the soft soil and of true foliage, of real trees and flowers, there arose the power of the Mammalia; the hot large heart, the noble head, the tender breast, swift pace, and sensitive limbs. Time flies, and with the multiplying offspring comes the awful pressure and the cry for more food, and the children of Mammalia are driven by the keen pangs of hunger to explore every spot and corner of the earth, from the shores of Australia, their birth-place, to the very northern pole, and from the peaks of the Himalayas to the depths of the Pacific, and forced to try modes of life which, when compared to the shifts of the starving London *gamin*, are as strange as the scenes in the “Arabian Nights,” when compared to those in the “Vicar of Wakefield.”

No wonder, then, that as the ages pass, such diverse habits result in diverse natures. Some took to a purely animal diet, and made good their revenge on the old reptiles who had,

through persecution, made them indirectly what they were; and this continued mode of life served to develop the fierce and angry passions, and the tough sinews; they became carnivores. Others, generation after generation, fed peacefully on the green herb that spread out so bountifully before them, and their bodies grew large and yet larger, to enable them the better to digest such coarse fare, while the feet having such great weight to support, and often having to run over the rough plains, became hooved and clumsy. Yet with food always before and under them, their posterity is insured, and unlike the lion race, whose life is one of continued excitement and anxiety, they have leisure to chew the cud in quiet siesta, and to indulge in the soft delights of love; to create a chivalry and to institute a "*law of battle*," the admiration of all the earth.

Time flies. The population of the world still on the increase; the age is progressive; competition grows keener. Strong and swift and intelligent in these days must be the animal whose race shall assume a position of superiority. One class we have overlooked, the smallest and most insignificant, and, consequently, most persecuted on all sides.

Not permitted to share the grass with the hooved tribes, constantly preyed upon by the ravenous carnivora, in wild fear they were driven to the extremity of climbing trees, where jeered and mocked by the light-winged bird, and in mortal terror of the snake, they had to seek and pick up a miscellaneous living of fruit and eggs as best they could. Such a course of life developed a race timid, treacherous, cunning above all others, but by the habit of grasping branches they developed the curious and delicate sense of touch to a hitherto unknown extent. This is a strange power in *touch* well-known to psychologists; it is chief of all the senses; eye and ear would avail little without it, for it is their interpreter; the *delicacy of the sense of touch of any animal is the gauge of that animal's intelligence*.

As you have already surmised, the sensitive timid little

creatures I am describing are the simiads, and we may watch their evolution with considerable interest. There is a certain diabolical witchery about this order that is unaccountable. The lion awakens within us feelings of awe, the "king of beasts," and we look upon the noble horse or ox with respect, but the monkey, that human burlesque, ever awakens in us a disposition to laugh, and yet it must be confessed we are fascinated—it is, perhaps, no laughing matter; note that the monkey *can throw a stick* at us for our irreverence, which the king of beasts cannot do, and this faculty of stick throwing may be developed into untold things.

I must refer you again to the sense of touch, whose importance it is difficult to overrate; sight itself is but a modification of it; to the hoofed animals all appears flat; even to creatures like the dog and the cat, the ideas of the form of things are scarcely superior to those which one might obtain by feeling the various objects with the end of a cane; to the average animal, rock and tree appear very imperfect, much as they appear to us by night—to a certain new creature, *man*, who appears at this juncture with that *opposable thumb*, who has felt them and grasped them over and over, their lines become distinct, they form, in fact, certain reflections, *images* of themselves on his brain, and this is the beginning of wisdom. As the race increases in size, and by generations of inherited experience, these images become permanent and clear, they begin to play a very prominent part in the animal economy; they join together and make others, they form a little world of their own, they are inherited, modified, survive and perish as do animals themselves; they unite and give birth to a new creature which is more extraordinary still—this new creature is an *idea*.

As the images grow into power, they tend to express themselves by muscular action, by cries. These very expressions make images, shadows of shadows—*ideas*, and these, no less than the ancestral features, are transmitted to the offspring,

which in turn adds to the stock ; and now ensues such a propagation of ideas and images, that the brain can scarcely hold them. What is the result ? the head grows enormously.

Vague images, first expressed by equally vague eries, become definite ; both grow in coneert, and for every image there is a sound, and one for every idea.

A new world is created, a miniature reflection of the one which it is the object of this book to describe, and this internal world growing out of the other, a part of it, subject to the same laws—it is a pocket edition of its prototype.

It is by the succeeding generations each repeating the edition more and more in short-hand notes, that they acquire a growing understanding and power over rock and water, the plant and the brute.

THE BASIS OF SOCIETY.

Such a skeleton sketch can give but a very faint idea of the real course of life. In following chapters I shall endeavour to fill it out. Considered merely as an outline, however, the sketch has serious faults ; it is not comprehensive enough, and it is too superficial ; the immense class of the insects is not included. Worse than this, the vast organisation which really forms the grand bulk of society (and it constitutes its entire foundation) has not been noticed. I refer to plants.

We must invent a more ample scheme, one that shall embrace all nature, and we must have a deeper foundation, a true framework for a basis.

“Life sleeps in the mineral, dreams in the flower, and awakens in the man.” To the student of human nature, the contemplation of sleep is of little account, but the study of the act of dreaming is of immense consequence.

The fact is, man must still more humble himself. The historian, and the moralist, and the novelist, and the biographer must come down, not only to brutes, and to reptiles, and to jelly-fishes, but they must stoop to vegetables.

Rocks are the foundation of the physical world. Plants are the foundation of the mental and social world. Let us begin to cultivate the *flowers* so long neglected.

A popular delusion must be disposed of before proceeding,—the belief that plants have no mind.

ANIMAL AND PLANT ARE ONE.

“PLANTS ARE ANIMALS THAT HAVE TAKEN ROOT.”

A modern French writer, who has done much to popularise science, sustains in his latest work this thesis. I shall here reproduce a portion of his most interesting arguments :—

“The plant has the sensation of pleasure and of pain. Cold, for instance, affects it painfully. We see it contract, or, so to speak, shiver under a sudden or violent depression of temperature. An abnormal elevation of temperature evidently causes it to suffer, for in many vegetables, when the heat is excessive, we see the leaves droop on the stalks, fold themselves together, and seem withered. When the cool of the evening comes, the leaves straighten, and the plant resumes a serene and undisturbed appearance. Drought causes evident suffering to plants. Those who read the touching book of Nature with tender eyes, know that the plant watered after a prolonged drought shows signs of satisfaction.

“The sensitive plant, touched by the finger, folds its petals and contracts itself. The botanist saw one, which he was conveying in a carriage, fold its leaves while the vehicle was in motion, and expand them when it stopped—a proof that it was the motion that disturbed it. A drop of liquid acid falling on the leaf of a sensitive plant produces a similar constriction. All vegetables present an analogous phenomenon ; their tissues curl when they are brought in contact with some irritating substance. Rubbing the tops of lettuce will make the juice gush out. Narcotic poisons put to sleep or kill plants, as well

as animals. You can put a plant to sleep by washing it with laudanum.

"Plants sleep at night. During the day they develop their vital activity ; and when night comes on, or when they find themselves in darkness, their leaves take a new attitude, which is a sign of repose—they fold themselves together. Respiration, absorption, circulation, are alike functions of plant and animal.

"The mode of multiplication and reproduction is so strongly analogous in plants and animals, that it seems impossible, in view of this extraordinary resemblance in the most important function of all, to refuse sensibility to plants, while we grant it to animals.

"Fecundation is effected in the plants by an apparatus of the same typical form as in the animal kingdom ; that is, it is composed of a male organ, the stamin, and a female organ, the ovarium, supported by a stem called the pistil. The pollen fecundates the ovule contained in the grains of pollen in the ovarium, as the semen of the male fecundates the ovule in the animal-egg. The fruits of each fecundation then develop, with the aid of heat and time ; the vegetable egg grows and matures like the animal.

"Let us add that the analogy between the two modes of reproduction in the two kingdoms does not end here ; resemblance may be detected in the details of the function. A peculiar vital activity, a tumidity of the tissues, attended by a local elevation of temperature, is noticed at the moment of efflorescence—that is of fecundation—in certain plants.

"How can we believe that a creature which is the theatre of such phenomena of excitement has no consciousness of these states ? The plant, like the animal, has its amorous seasons ; and will you contend that it is unconscious of them ? Will you insist that the plant which becomes heated, in which life is highly excited at the instant of fecundation, feels nothing in its inner nature, that it has no more feeling than

the stone that sleeps at its feet? We do not believe this; we cannot conceive of life without sensibility, one seems to us the index of the other.

"Animals in all their classes, as well as plants, multiply by sprouting, cutting, and grafting. The polyp and coral are examples.

"Plants, like animals, have their maladies. Old age and death come to one the same as the other.

"Locomotion is not the sole prerogative of animals. Some real animalculæ-plants have the shape of eels, and move by the aid of two long filaments in their heads. Others resemble the tadpole frogs, and whirl about in the cells of mosses. Yet it is such creatures, whose organs of locomotion are so plainly visible, and which the microscopist sees hop under his eyes, that certain botanists insist are insensible.

"Everything is graduated in nature. In denying to plants sensibility, we give a Cornish hug to nature, without rendering a reason for it. We see sensibility gradually diminish between man and the mussel, and think that it stops there—that the last-named animals are the very lowest. But there are, perhaps, many degrees between the sensibility of the mussel and the plant, and many still between the most sensible and least sensible plant. The graduations we see everywhere must convince us of the unity of nature. The new degree of beauty that it seems to add to the system of the universe, and the pleasure found in multiplying feeling creatures, must still more powerfully persuade us to accept it. We love to believe that the flowers that adorn our fields and gardens with a beauty ever new; that the fruit-trees, whose treasures please our eyes and palates; the majestic trunks that compose the vast forests, which time seems to have respected; that all these are feeling creatures which, in their own way, taste the sweets of life.

"Plant a seed bottom up, the embryo plant turns itself over so as to rise in the air; uncover one of its roots and place a

wet sponge near, it will follow the sponge in whichever direction you move it ; turn a leaf bottom up, it will turn back again ; some leaves shut themselves from the sun in one way and from the dew in another ; if a wet sponge be put under some leaves, the latter will turn towards and adhere to it," &c., &c.

Such are the leading facts adduced. What conclusions are we justified in drawing from them? Are we hereafter to refrain from picking bouquets, chopping trees, or turning the cattle out to grass for fear of wounding the feelings of our verdant leafy cousins? Will future ages inaugurate a society for the prevention of cruelty to vegetables? I do not think so.

The conclusions which I draw are the following :—

1. Plants have rudimentary sensations of desire, yearning or "thirst," arising out of the instinct of nutrition. They have also the correlative sensation—that of satiety or satisfaction.

2. They are susceptible in a degree to the emotion of love, as arising out of the sexual and social instincts, which in all the flowering plants are considerably developed.

3. They have no sensibility to pain or fear, and no notion of resistance or of locomotion.

It will be seen that, though beyond question the plant is endowed with a soul, yet still it is in so rudimentary a state as scarcely to afford material for a good modern romance *founded on facts*. Such is, however, occasionally attempted with success; the following is a fair example; mark, it is no Æsop's fable either, but a rational matter-of-fact novel.

The author begins by stating, "that, in going down cellar he had trodden on a long white potato sprout. It had got out of the bin, and stretched out towards the window, long, pale, thin, and sickly. It had got half way to the light when I trod on it and crushed all its hopes.

"I pitied the poor straggler, and took up its bruised body and laid it back tenderly in the bin.

"As I did so I noticed that the potatoes were holding a

meeting, and consulting what to do. They were gathered up together in a pile, and every eye was turned anxiously towards the light.

“‘How plainly I can see it,’ said one; ‘if I could only get there I know I should grow.’

“‘But we cannot get there, is the trouble,’ said a fat potato, who was on top of the heap; ‘no good comes of stretching out to get to the light.’

“‘Well, I am sure I can’t help trying; something in me makes me feel as if I should burst, every time I look over yonder toward the window. At any rate I’m going to try it to-morrow. I’m going to open my eyes wide, and send out a feeler; and see what the chance is, anyhow.’

“‘Chance!’ said a feeble voice, ‘chance! I felt so once; but look at me now.’ And all the potatoes turned their eyes to look at the speaker, who was too feeble to come to meeting, but lay off at the edge of the bin, all shrivelled up, with a bruised and bleeding sprout coiled around her. She continued; ‘Yes, look at me. I am nearer to the light than any of you. I always have been. I have more eyes than any of you. I was the plumpest potato in all the bin. I slept soundly, and lay still. I was fat and contented, till one day I saw that light you are talking about. After that I couldn’t shut my eyes. I felt as if everything inside of me wanted to get out. I tried to roll over, but I couldn’t, and so one day I let one of my eyes stretch wide open, and stuck it out a little way to see plainly. But when it got started it couldn’t stop. It kept pulling and sucking, stretching and growing, till it sucked out all my blood, and used up all my flesh; but nothing came of it. This very morning it all came back to me, long, pale, blind, and bleeding, and I am a tired-out, used-up potato. Better shut your eyes, for no good comes from looking over yonder. I wish I could have found out what that light is, though, and where it comes from; but I can’t, I’m too weak!’ And the old lady closed her eyes tight, but

there was a little wet round every eye. My cook said, '*Them 'taters is all a rottin'.*' But I knew they were only weeping because they wanted to grow and couldn't.

"'There,' said the big potato on top of the heap, 'that's just what I told you. Better be eontented. My eyes don't trouble me. Keep together in a heap and you won't see anything.'

"'Hear ! hear ! hear !' called out a hundred thick voices down in the dark, and all the stupid potatoes thumped on the bottom of the bin till it shook again.

"'Keep in the dark and you won't have any trouble ; this meeting is adjourned.'

"Then the big old potato settled down into the dark among the rest, whose eyes never troubled them. But as many as sixty or seventy rolled down on the outside of the heap, and began staring at the window till their eyes stuek out at inch, and they said 'What is it ? What makes me feel so ? What shall we do ?'

"The next day I took a basket and went down cellar and pieked over the potatoes ; all the potatoes that had their eyes open I put in the basket, all the other ones who had their eyes serewed up tight, I tucked away in the dark, and every day my cook goes down and gets a dozen of them to roast or boil. But all the *watchful* ones, which I put in the basket, I have brought up and planted in my garden.

"And every still moonlight night now, I hear the green vines whispering to each other about their pretty purple blossoms with orange centres. 'How different it is here !' 'What fun it is to grow.' 'I am big enough to eover a hen's nest with six eggs.' And when I went to the hill where I planted the poor old lady who sprouted so in the cellar, I found the leaves soberly talking together about thirteen little potatoes that were hanging on their roots, and they were growing every day."—T. K. BEECHER.

The belief that the father and mother potatoes experience

a clinging and tender fondness for the bright eyed little potatoes, is not unreasonable; that every well-bred potato is sensible of the clamour and strainings of the awful inner man, which causes their growth, is by no means doubtful. It is plain, therefore, that such creatures *possess mind*, are animate—animals.

On the other hand, a single sentence from a natural history will show clearly to the thinker that the lower animals, at least, are but plants, whose zeal, activity, and feelings, upon these two heads, have from some cause become considerably exaggerated.

“The compound stem of the zoophyte is composed of Polypes (*zooïds*, animals), living an associated life, and so connected together as to produce the most graceful, plant-like structures—vegetating like a tree, putting forth thousands of Polyp-buds, like leaves, but all of them alive and hungrily supplying the commonwealth with food. After a time, however—just as a plant puts forth its flowers—buds are produced, charged with the perpetuation of the species; and these ripen into transparent urns, beautifully sculptured and furnished with lids, which, when opened, give issue to innumerable active blossoms, able to flit about through the water like butterflies, laden with eggs, and ready to disseminate their race through the seas.”

All this is striking, thrilling; it prepares the reader for the astounding disclosures that are about to come.

“COMETH UP AS A FLOWER.”

THE MORPHOLOGIST'S DREAM.

—“thee perplexes, beloved, the intertangled confusion
Of this flowery throng, which in the garden thou see'st;
Many the names you must hear, and ever one after another,
With its barborous clang crowds itself into your ear;
All in their forms are kindred, and yet no one like another;
So this wonderful choir points to a half hidden law,
Yes, to a holy enigma. O, could I teach thee, beloved,
Happily teach thee the Word which will unriddle it all.”

GOETHE.—*The Metamorphoses of Plants.*

THE FOUR TYPES OF LIFE ACCORDING TO CUVIER.

Radiates, in construction, resemble a flower or plant, but differ from them in having a mouth and stomach. Their bodies are nearly transparent, and seem only to float or rest in water.

Molluscs are those which have soft bodies without bones or skeletons; some are naked, while others are enclosed in shells for their protection. Of the latter, oysters, clams, and snails furnish examples.

Articulates are characterised by jointed or articulated coverings consisting of a series of rings; they comprise such animals as worms, crabs, lobsters, spiders, and winged insects.

Vertebrates.—Animals having a vertebral column or back bone; fishes, birds, reptiles, and quadrupeds compose this class.

THERE ARE TWO CLASSES OF PEOPLE IN THE WORLD:

Progressionists, who point to the wonders of this modern age of lightning and steam, and paint a gorgeous and expansive future. Elcelsior is their motto—great results from little beginnings.

The course of life appears to them like the growth of a tree,

which, from a sickly little sprout, becomes a vast marvel of perfection—of leaf and flower and fruit.

Conservatives, who look *backward* to a golden age, a glorious beginning of life upon the ideal basis of Beauty, Virtue, and Truth ; a noble *past* compared with which the present is mean and petty.

They picture life like a *horn*, of which their historian must delineate humanity as gradually approaching the little end.

Our views of life shall be more perfect than either of these, for we will bind together the two conceptions, and the broad end of the one shall extend the narrowness of the other.

Thus I see perfection at both ends of the scale, the image of the Creator in the beginning, in the fair round cell, no less than in the mature man, nature's last effort.

The living world appears to me like a staircase, the cell the lower step, the man the upper, yet all are equally perfect, for each succeeding one is but a modified repetition of the previous.

Let us descend the divine steps. There is "man in his cities ;" "beasts in their forests ;" upon the brown earth creeping things ; below, in the ocean depths, myriads of varied creatures ; and deeper still, the dainty sea flowers show their heads ; beneath them the velvet sponges ; and, lastly, upon the bottom stair, a world of beauty like the stars, nebulous protoplasm—a universe of cells.

Let us remount the steps.

Step First.—Time, a hundred million years ago—the good old time ; scene—the bottom of the deep. We will take a homely simile, a frying-pan into which several eggs have been broken ; see the hemispherical lumps, and the viscous albumen upon the bottom ; now enlarge our pan until it encompasses the globe ; multiply upon its bottom those lumps of albumen *ad infinitum*. The living world is in the egg ;—there is no genial soil, and through the deep water, all is silence and expectation.

Step Second.—The yolks have puffed up like rising yeast, and each one is a sponge ; opening life, yielding and soft, yet with a will in embryo that shall guide each monad to a higher destiny. Their ways diverge ; from the form of the round sphere they change ; those with strong will depend on self ; within their vitals there rises a firm support—an axis—and all centres around it ; their shape grows to be like a hillock, swollen from the centre, cone-shaped, and throwing their strong roots deep into the parent protoplasm ; they suck up lustily through their feet the life current.

Their brothers, on the contrary, are unstable ; they sway about in the heaving waters, and upon their tops only, they absorb the bits of nutriment that chance waves throw up, and these bits being drawn downward into the soft mass make it cup-shaped. Could you have known the brothers *Cup* and *Cone** in the family of sponges, you would have said : The Cone begins with a firm basis ; he will build a name ; he has a good foundation ?

They are acquiring habits totally opposed ; leave them—roll on the ages.

Step Third.—The cup and cone sponges are no more, yet the bottom of the sea is peopled with their descendants, and in the changed lineaments of these, we may still see their origin. The two sponges have grown to be flowers, one shaped like the pine tree cone (a pine burr), the other like the water-lily head ; one convex, the other concave ; still cup and cone, though each have now put forth their petals. They have put forth their petals, as the sun sends forth his rays, or the snow-flake his crystal sprays. The sun, too, was once a spongy mass, instead of the definite and solid thing it is.

A floral age ; pine cones and water-lilies give you an idea of their *forms* ; their *substance* is like the inner leaf of a cabbage, or like the delicate membrane which lines all animals ; their sizes vary all the way from a pin's point to that of a mountain.

* Something like Heliozoa and Acyttaria—Infusoria and Myxomycetes.

And the old habits cling ; the cone grows staunch and firm, and it is rich in life, and each long-growing petal produces its little ones, for there is food enough in the parent stem for all. The lily is vacillating ; blown about by every breath, with a slender useless stem connecting it with the soil, it gathers no nutriment, but is dependent on the morsels brought to its cup by the chance waves ; thousands are broken off and float about,—perhaps, on the whole, a lucky mishap ; their condition, thus, can be no more precarious than before, for they eat not through their stalk, but through their chalice ; a flower living a very unfloral life, one moment gorged with food, the next, reduced to the verge of starvation ; excitement, peril, their petals are the centres of a thousand conflicting vibrations ;—they are living a fast life, these flowers.

Step Fourth.—Other races, other scenes on the same spot ; upon the apex of the pine cone, six little ones are clustered, upon each of these again are six,—a branch, a cone family tree,—and the petals upon the parent cone are many, but soldered together, while upon the upper ones they are scattered, spread out, and turned green by the sun's rays. There is a tree within the bosom of the deep,—many trees,—there is a forest of trees and shrubs.

This is the reward of virtue, steadfast and laborious plodding in the dull earth. The children of the cone shall be like the sand upon the shore, they shall outnumber a million to one those of all other creatures.

Let us see what becomes of the wandering lily-heads. The race has now broken permanently from the stalks, and the floating heads yet thrive and multiply and change ; some unite their petals and are, like the *Campanula*, Gamopetalous ; some of these, still farther modified, are slender and like a trumpet, and all these live and multiply and fill the waters.

If you hold the head of a pond lily bottom up between the thumb and fingers, you may observe the petals vibrating with every breath ; suppose it to be an animated being, you thrust

a lump of food up into its cup and the petals quickly clasp and imprison it, as the sensitive plant imprisons the wandering fly. These petals are of a half liquid slimy consistence like the oyster's tissue, and the clasp often repeated, they are glued together and the lock is permanent, they are destined never again to be unclasped ; look up under the closed flower and those stamens present a long row of little quivering feet ; the nourishment must hereafter enter above and at the upper end of the row. Clasp your hands tightly in front of you as they hang, let the palms touch, but do not fold down the fingers ; there is the inverted and transformed lily—the type of the *insect* throughout the world. Just under the thumbs you will find the gaping mouth, and you can make the fellow walk off on his eight feet, like a very respectable caterpillar handling his two thumb-antennæ before, with proper insectile dexterity.

The history of the trumpet flower is briefer ; he keeps right side up with care, but finding himself too tall, he gets a habit of rolling up, and so the roll goes higher and higher until he is all a roll, a mollusc, a cochlide, a rolled-up trumpet flower.*

It is the last and least precocious of these three floral brothers, the bell form, which has a startling history ; the petals grow fast together, and there is a cup as perfect as a tea-cup. Among many flowers these are the oldest ones ; our *campanula* must have remained long in the floral stage thus to have grown gamopetalous. Well, the morsels of food are not wanting ; there are no petals to clasp around it, but the edges fold together instead ; if they should roll up tightly, the result would be a horrid worm, but they do not, there is a neat fold, a growing together, and nothing more. Hold a saucer bottom-up in your hands, suppose it to be made of soft material, let the edges lop down and join together. Is it not the plainest thing on earth, that every fish that swims the sea is fashioned

* Many of the mollusca do not seem to have been formed in this way, but their appearance implies a vermean origin.

after this model* (and even the degraded oyster is nothing else than a crushed cup)? Remember this when next you see an opened fish upon the culinary board, and reconstruct the primæval cup—the cradle of animal life. Not less clear is the form seen in the body of the bird; notice it, I pray you, when next you discuss the chicken. Observe likewise the floral form of the tortoise when next you have occasion.

Turn once again to the lily. There is food lying along its centre; as it is absorbed the solution passes to the base of the cup—that is to the back of the insect; a blood reservoir is created—the first heart. Upon the forward stamens fall the shocks of the outer world—sound and light, and these stamens catch and conduct the vibrations down into the organism. To what part? Where there is most motion; along the ventral aspect, among those quivering feet the current passes—and thus the life-currents flow,—blood at the back, food through the centre, and nervous force along the abdomen; and this is the condition of every insect.

How is it with the other flower, the solid cup? The heart and stomach are the same, the forward stamens here too are sharpened into bright eyes which catch the sunbeams—but mark, the many little feet are missing,† there is nothing to draw the force downward, on the contrary, it is along the upper sides—the back of the cup—that a wagging muscular contraction is slowly generated, and hence to its support rushes the electric current in a spinal cord.

At each extremity of the ventral seam, there are, it will be

* Not orthodox morphology. Try it another way, push out the bottom of a tea-cup with your cane, imagine it made of jelly instead of porcelain, let it remain strung on your stick which answers to the back bone, let the mouth be contracted until the shape of the whole is like a banana, hold it horizontally until the two sides drop—the result is a form like a fish, and the one above described. This is the true process; there is a tubular *transition* stage.

† It is the *ribs* of the back-boned animals that correspond to the feet of the insect.

seen, four free edges, flaps, which wave lightly with the water's motion ; and this slight movement is sufficient to attract creative force to these points. Four buds appear, we call them fins, but they are true buds, as much as those that spring from the rose ; perhaps they will grow to the flower stalks, who knows ?

More than a half of the course of life has passed, and all in the ocean depths. Over all the earth the air is voiceless, and the waste of barren rocks shows no soft living forms. Thus in the world's watery cradle the rude forefathers of every race of animals and of plants have passed their days, never lifting a head above the surface, or dreaming of other worlds and other scenes which are to be their children's heritage:—but time brings changes.

Picture the greatest tide of emigration the world has ever seen ; up into the pure air, out over the broad lands, age after age, upward and onward, flow the living streams, and high hopes, deeper aspirations, fill each beating heart ; it is a renaissance, a grand awakening ; the soul grows winged ; we might almost expect to see the poor fish changed to the wild bird for very gladness, and the humble caterpillar to the gay and joyous butterfly.

Step Fifth.—Years on years, ages on ages, a new world, new scenes again, and new friends. No ; in the depths of the great air ocean, as in the depths of the old salt ocean, there grows the wilderness of tall *cones*, and creeping and floating over all are the transparent floral *cups* of every size and colour.

The ancient pines declare more clearly than the younger trees their origin. Break off a branch from their tall tops and look at it ; it is made up of cones.* The whole tree is but a cone, winding its branch-petals round the strong sustaining axis, which is the secret of its greatness. I hold a pine-burr in my hand ; it is a type of the whole vegetable world.

* It is only in Norway pine that this can be clearly seen.

A wounded bee is lying before you upon his back ; look down upon the trembling petals, there is your lily ; stamens are bent forward, and light, and sound, and magnetic undulations centre on their points, which we call organs of sense ; stamens and pistils are bent backward and perform the reproductive functions, as we see it in all other flowers. In early days, too, there was a struggle in the organism, to see whether the many petals growing together should make a body smooth and uniform, or whether their separations, extending still deeper into the base of the cup, should reduce the whole to segments ; and the latter partly triumphed,—hence the ribbed appearance of the insect.*

Has any one observed how the kitten, pig, and puppy instinctively curl up in crescent-shape ? They look like crook-necked squashes, which are also developed from flowers.

Mothers, the same true flower lies in your lap “laughing and crowing ;” the small pedal-rudiments, the ribs, are there, and deep in the cup all the nerve-stamens ; there is the flower in its old position, as millions of years ago it reared itself in the deep sea. Strange isn’t it, in this interesting position proud man is born into the world, and in the same humble posture he always leaves it ! †

* Morphologists will again object. Annelida are doubtless “like a string of beads ;” formerly, however, I think, *by division, and not by gemmation*. The antagonism between outer portion and centre is observed in the cell itself. “Fast immer geht der Theilung des Plasma die Theilung des Zellkerns vorher, und die beiden so entstandenden Kerne wirken nun als selbstständige Attractionscentra, um welche sich die Substanz des Plasma sammelt.”—HAECKEL: *Generelle Morphologie*, vol. i. p. 288.

† The Japanese custom of hari-kari, in the light of morphology, assumes an artistic aspect. Forcibly to open the petals, and to pour out the heart’s blood, is decidedly preferable to our own practice of throwing lumps of cold lead into the economy. Dynamically (spiritually) considered also, it as a much more *elevated* gratification of the irascible emotion ; to strike your neighbour dead because he has injured you, is the act of a highly-developed brute. To take your own life, with the magnificent, boiling passion of revenge to guide the knife, and thus force him to do the same with only cold pride to help him out, displays exquisite reason.

I spoke of four buds appearing in the long ago ; those buds have grown to be the four stalks tipped with four blossoms, which are called hands. Oh ! reader, did you know that your two arms are branches, and your hands true blossoms ? And did you know that, by the laws of growth, those children-flowers must be the exact counterpart of the parent-flower, your bodies ?

Would'st know of what thou art ? put the palms of your two hands together, touching all your finger-tips ; now draw the latter inward towards you, keeping the hands together ; there you are, there are your ribs the fingers ; and the thumbs are the reduced image of the two halves of your precious brain, and thumb and brain are developed, each in proportion as the other is, in all creatures. In the hoofed animals both are rudiments ; in man they are chief of all. Without a thumb, man never could have been civilised. Without a brain, he would have been a plant ; without a thumb, he would have been a brute.

Each hand is literally the offspring, and hence, necessarily the image of its side of the body. Every impression made upon the latter must repeat itself in miniature upon the former. There may be a science of the hand then, a new way to read character, a science like phrenology ; but such truths are unfortunately too vague and abstract for us at present to utilise. There may come a time when head and hand shall both be open pages, which the scientist instead of the charlatan may read.

Would you like now to see my herbarium, my museum of skeleton flowers ? there you will see the sponge, cup-shaped and cone-shaped ; the large polyp, like the campanula and the lily. I have the skeleton of a bee, too, and one of the fish, and of the bird, and of the beast—with their white rib and vertebrate petals—seven fair, white flowers.

What is the lesson that my floral museum teaches me ? It is the great law that nature is uniform. *Nature is one.*

Two classes of creatures in the world ; the one trained from

its earliest years to habits of industry and sobriety. Steady plodding in the earth brings its reward—long life, noble proportions, a life of centuries, a central trunk and constitution, which not sickness, nor even hurricanes, can shatter. These creatures are the bone and sinew of society.

The others show a contrast ; cut loose in early infancy from the parent stem, suffering from hunger, storm-tossed, restless, ever filled with weird aspirations for they know not what, and longings which torture them into constant activity, they have no permanent abiding-place, and none of the world's goods, the sustaining life-current.

Plants are the solid and substantial citizens, the moralists, devotees, *conservatives*. Animals are like the world's corps of savants and of geniuses, who are philosophers, *progressives*.

Plants possess the instincts of egotism and of love, the rudiments respectively of metaphysics and religion ; but they have no notion of matter and force, the fundamentals of science.*

This great natural distinction should be well borne in mind when discussing the question of the position of the fairer sex. Woman has much of the floral in her nature ; man more of the animal.

A LESSON FROM GREEK AND ITALIAN ARTISTS.

“A passion for the beautiful, for the sole sake of beauty—

* The botanist interposes here with a large exclamation point, “How can plants feel and think when *they have no nervous system?*” Do you think so, Mr Botanist? And yet you say, “The PITH has been compared to the spinal-marrow in animals. It appears to be an important part of the vegetable substance, though its offices are, perhaps, less understood than those of the other parts. The MEDULLARY RAYS are lines which diverge from the pith toward the circumference ; they are fibrous textures interwoven in the wood, the alburnum, and the different layers of the bark. The new buds seem to originate at the points where they terminate.”

“Thus nature dwells within our reach,
But though we stand so near her,
We still interpret half her speech
With ears too dull to hear her.”

a passion bordering upon religious enthusiasm, inspired the highest achievements of the ancient Greek and the more modern Italian masters in art. And nothing is more remarkable than the marvellous indescribable charm with which they contrived to invest their finest human heads by finishing them with a touch of nature less—or more—than human. The Greek sculptors delighted to crown their noblest figures with something of the lion, or of the bull, or of the cow, or of the deer, or of some other familiar member of the brute kingdom. It is difficult to say which element was most highly idealised by this process of joining the two natures together. The conjunction which has raised for the philosopher and theologian a puzzling, slippery and perilous theme of speculation, opened to the Greek artist a rich field for extravaganza ; and how boldly and yet exquisitely they wrought in this field, let those grotesque people, the fauns and satyrs, headed by the quaint but venerable god Pan, attest.

But it was reserved for the Italian painters, who made the ideal of beautiful womanhood the object of their worship, to go still further to import from the ultra-human world the crowning mark of beauty. And in this way their tastes leaned more to Flora than to Fauna. In their finest female faces and figures there was sure to be something mysteriously and captivately suggestive of the rose, of the lily, of the violet, or of some stately, graceful and attractive plant, or of some richly tinted, odoriferous and delicious fruit. And why was this? There is but one explanation. The cultivated instincts of artistic genius could not fail to be deeply impressed with the profound and awful analogies subsisting between the human world and all the rest of organic creation ; and in this case it was especially struck and fascinated by the strong natural affinity between women and all that is most delicate and lovely in the developments of the vegetable kingdom—an affinity triumphantly attested and proclaimed in immortal conceptions of perfect womanhood embodied in pictures which

poet and critic unite in recognising as things of beauty and joys for ever."

Plants and animals are the two greatest contrasts that life presents, yet, even these, at base, are one.

All classifications are artificial; there are no breaks in nature's chain, no dividing lines across her face. We may speak of the animal and vegetable kingdoms for our convenience, but, in reality, the great vital world is one. Plants are animals which have taken root. Animals are flowers which, early broken from their stalks have, by a long life of independence, *learned to move and to reason*.

I will show you Nature's plan, I will reveal to you the law that unites in one bond of harmony the bright stars above our heads, the plant, and great man with his immortal soul.

1. The stars are spheres; the myriad cells that roll through every tree, and leaf, and blade of grass, are spheres; the molecules that compose all moving creatures, from sponge to man, are spheres, all built alike upon this type of globe or ball; when we see how universal this form is, it should deeply impress us; it is perhaps as near as finite man can picture it,—the image of the long-sought Infinite.

2. A drop of water forming on a flat surface can not be perfectly spherical, but rather hemispherical, and this is the type of the lowest sponge.

3. The sun throws off rays from its centre outward. By this process the crystal grows, and thus grows the hemispherical sponge.

4. Thrust a pin down through, and fasten it to the earth, and suppose that growing material constantly comes up through this pin; it becomes a nourishing centre, a long centre, an axis; and throwing off rays continually along its length, the hemisphere would presently become elongated, conical, a cone, a tree.

5. Do not pin down the hemisphere; let there be no upward axis conveying nourishment, but let it drop by chance bits

upon the top. Being solid and drawn down, it makes a passage the opposite of an axis, a tube, and the result is cup-shape, and growth, instead of being in the centre, is around the circumference. The giant tree of California is tall ; by the constant increase of that grand institution, the trunk or axis, the cone has grown a tall one. The elephant is but a paltry ten feet high, but see its length and breadth ; the all-absorbing axis was not there, and the tubed-cup has only increased laterally.

Star and cell at base are one,—the sphere throwing off rays of force : animal and plant, cup and cone, in last analysis, are one ; the hemisphere, throwing off rays from centres, also. Well, the dead inorganic planets are perfect ; living things are not ; each individual of them, flower or animal, is but a hemisphere,—a half of something. It is by the union of male and female, man and wife,—the half sphere and the better half sphere,—that the perfect being is reached.

“Two souls with but a single thought ;
Two hearts that beat as one ;
Two forms that make a unity.’

“The more married men, the fewer crimes there will be. Marriage renders a man more virtuous and more wise. An unmarried man is but half of a perfect being, and it requires the other half to make things right ; and it cannot be expected that in this imperfect state he can keep the straight path of rectitude any more than a boat with one oar can keep a straight course.”—*Voltaire*.

SPECIALISATION IN THE CIRCUMFERENCE, AND SPECIALISATION IN THE CENTRE.

These are the days of specialties ; a thousand years ago, to produce a suit of clothes required but one man,—to-day, it takes hatter, bottier, chemisier, tailor,—four at least. This is

the history of man's second envelop, the superficial product ; turn now to the central product. Among the very lowest organisms, a maternal creature alone suffices to produce an offspring ; in animals, this is the joint product of two creatures ; with savage man it is the same ; with social man—no marital organisation is complete without a physician and a nurse.

I am not a sceptic. My faith begins with the Hebrew Bible, the oldest of all books. The old things I cling to and love best, and I study them *first of all*, for it is only by the understanding of the old that I can comprehend the new. Would you know my creed, it begins thus : "In the beginning God created the heaven and the earth, and he made man in his own image, after his own likeness." Thus begins my creed ; and I think I see a perfect harmony in ending it with the belief that he endowed man with intelligence through which he might seek and learn the mode of that creation,—that he might learn the form of that likeness the better to reverence it.

In the highest expression of that intelligence, science, I see the perfectly harmonious truth that he created the heaven and the earth, not in a single night by a preposterous miracle, like the birth of an Aladdin's palace, but in the quiet and natural way in which to-day and every day he creates the crystals and the water drops ; that he created man not in an hour as a child might make a doll by cutting out arms, and head, and legs, and pasting them together, but again in the same great natural way ; that he created *the* man in the ages past as each day now is created *a* man—a slow and quiet growth, beginning with that most perfect form of which the mind can conceive, the cell.

In a score of years the cell becomes a man ; how beautiful the divine unity of plan by which, in millions of years, the cell should become the whole human race ! How beautiful the thought that the history of all our race is written in each one of our individual lives ! The individual is the race in miniature, as the leaf is the miniature of the giant tree.

Is it the fate of man that his most beautiful thoughts are ever destined to prove but dreams?

MAN AND THE VIOLET.

Three stages of progress—

Embryonic.—Forms: cup and cone. Examples—the zoo-phyte, protozoa, &c.

Transition.—Forms: rod and tube. Examples—plant-axes, worms.

Efflorescence.—Forms: bell-shape and boat-shape. Examples—flowers and fruit, insects, man.

There's oft a prophecy in dreams! O stubborn heart that believes all dreams but those of science, I will make one last appeal to you! I have just pulled up a pansy—I hold it up with the face toward me; the two fellow creatures are placed *vis-à-vis*; do you see no resemblance? Do not be led away as the vulgar are by mere external differences of colour and appendages and size. Leave out arms, legs, and other such accidental encumbrances. There is in naked truth only one difference. In the floral, the petals are spread out, and in the animal they are wrapped round the organs. The flower, poor creature, is only too open-hearted, she lives literally out of doors.

Perhaps the analogy is after all a little too distant; another one is found in something less æsthetic, a green pod of peas. The greatest sensation of the day is to go out to the vines and see all these little people hanging up by their feet. Do you doubt still the mighty truth of development? Perhaps you are where you can visit a museum and examine a big spider, the Tarantula—one of those famous Texan rangers,—you never saw unconnected with a stem a more perfect flower; you will find calyx, corolla, stamens.

Two little girls are playing in the garden, they approach each other and playfully embrace, the two little faces are

pressed tightly together. Down in the grass under their feet among the zephyrs, two violets are brought with their open breasts together, and they kiss each other. How can we prove that these two spontaneous acts of nature are identical? By showing that the form of the subjects performing these acts are identical. The likeness of form proves the analogy of function.

THE LANGUAGE OF FLOWERS.

As towers of strength in to-day's aspect of life's struggle, stand Chemistry, Physics, and Botany, these three; but the greatest of these is Botany. Among the many things which it behoves mankind well to look to in the impending mental crisis, the science of Botany is of transcendent importance.

The great study of the world is flowers,—that is the phenomenon of efflorescence; the production of the petals of the rose, the plumage of the peacock, the wings of the butterfly, and the smiles of woman. These products are strict analogies; here the great diffused soul of nature concentrates and becomes tangible.

Would it surprise you to learn that these analogies are but the terms of a series, that all are one, the links of a chain; or yet more truly, all flowers from the same tree?

Efflorescence,—the concentration of the great spirit,—is a multiplication-table of which flowers are the twos, and the human face “wreathed in smiles” the twelve times twelve; the intermediate terms, the sixes, nines, &c., are indistinct, obliterated, atrophied; the first and last terms are complete and perfect. Now *the twos are the key to the whole multiplication-table.*

HOW TO STUDY BOTANY.—Begin at the rudiments. Don't commence pulling flowers to pieces; the green slime in the nearest ditch is the botanical alphabet; dissect it carefully, and trace the direction of the divine force along its axes. Then the other green *sea weeds*, next the *liver moss*, then *club*

moss, and then with great care the *arbor vitæ*, the *pine*, *spruce*, *juniper*, trees. You have not yet, you will observe, arrived at so high an organ as the leaf.

Your next lesson will be a study of *sprouts*; you must follow their history from the time that they first peep out of the egg shell, till they flower and bear fruit.

Bear in mind that your business is not to admire, to wonder, to fill your head with hard names and coloured pictures. Your business is that of the hound on the track; you are to run nature down, trip her up and steal her secret.

This strange world of ours is not a mystery, the thought of which calls for the devout laziness of clasped hands and up-rolled eyes. It is a *problem* that imperatively demands the stern work of solution. **LABOURERS WANTED!!!**

CHAPTER V.

THE EARLIEST AGE.

ANTIQUITY—THE CHILD'S FIRST LESSON IN UNIVERSAL HISTORY
—THE NO-CRANIUM AGE!—ANTIQUITY DISCUSSED WITHOUT
THE LEAST REFERENCE TO THE PATRIARCHS, THE BABYLO-
NIANS, THE GREEKS OR THE ROMANS—FIRST FIFTY MILLION
YEARS OF LIFE—REIGN OF THE HEADLESS AND HEARTLESS.

“From dearth to plenty, and from death to life,
Is Nature's progress when she lectures man
In Heavenly truth.”—COWPER.

“Well begun is half done.”

ALL progress at the beginning is laboured and slow.

During the vast period of time above named, embracing fully half the course of the history of life on this planet, such a thing as a *head* had never been heard of ; the highest animals were symmetrical like a shuttle, passing in both directions, backward and forward with equal facility.

That other important institution, the heart, was no less wanting ; limbs, too, were minus ; life was dull, heavy, and simple. The daily routine of the oyster, with his joys and his sorrows, hopes and fears, his love and his aspirations, may be taken as a fair sample of what the civilisation of the time could boast. All was calm and quiet simplicity.

An Age of Animal Vegetation:—

Such, as a rule, is the beginning of all things. If you, being a celestial inhabitant, could have looked down upon the hordes of sluggish animalculæ that held terrestrial empire in these primitive times, and could you again have looked and beheld, as you might at the present day, the quick nervous pulsations of those intelligent colonies, the bees and the ants, the exqui-

sitely refined domestic life of the higher florals, and those nature-coercing societies of larger growth, of human beings. You would doubtless have shook your head with many another antiquarian, and say, "too fast, too fast."

"We are wiser than our fathers," say such reasoners, "but are we better? we live faster, but do we enjoy more?"

I am one of those who answer these questions in the affirmative. When I see what the world was in the ancient days, and what it is now, I take a new lease of life. When I contemplate this long vegetative age in which life slumbered away the first half of its existence,—sodden, "headless and heartless," my own heart beats hotter, and my brain works faster, like that of an adult man who sees behind him a boyhood heedless and neglected, and is roused by its image to a sense of his responsibility.

Let us glance now at some of the leading events, and study the lives of some of the leading races in this epoch so uninteresting, yet so wholesome to contemplate.

We will begin far back in the grey dawn, when among the seas of growing crystallisation, it was first defined what sort of life there was to be upon earth.

Life, as I have elsewhere shown, is the result of the aggregation of molecules of matter into such large masses that they are top-heavy, that they stand trembling, and lopping down as it were into firm-fluids, instead of remaining solids; and it is this trembling and lopping over, the constant falling and resetting of these jelly-like columns, that constitutes vitality. It is this, in short, that distinguishes man from rock.

"In the last century it was the fashion to explain every mysterious group of phenomena by imagining some wonderful entity behind it; and though the entity was in most cases a mere figment of the imagination, with nothing real answering to it save the word by which it was designated, it was nevertheless endowed by imagination with a value far higher than that of the phenomena which it was devised to explain; it

was the reality, *par excellence*. In accordance with this fashion, the activities displayed by living bodies were thought to be explained when they were called the workings of a 'vital principle' inherent in the living body, but distinct from it, and surviving unchanged amid its manifold alterations. If a stone falls to the ground, that is a manifestation of gravitative force; but if a stream of blood comes rushing through a capillary tube, and certain compound molecules of albuminous matter are taken from it and retained by the adjacent tissue, then, according to the vitalistic theory, the 'vital principle' is at work. During life this 'principle' continues to work, but at death it leaves the organism, which is then given up to the mercy of physical forces. Such was the theory of life which was held by many physiologists even at a time within the recollection of persons now living; and it may perhaps still survive in minds uninstructed in modern science. The theory of a 'vital principle,' dominant until the early part of the present century, is now completely antiquated. The great discoveries made since 1835 in chemistry and molecular physics have rendered it henceforth impossible for us to regard the dynamic phenomena manifested by living bodies otherwise than as resulting from the manifold compounding of the molecular forces with which their ultimate chemical constituents are endowed. Henceforth the difference between a living and a non-living body is seen to be a difference of degree, not of kind—a difference dependent solely on the far greater molecular complexity of the former. As water has properties which belong not to the gases which compose it, so protoplasm has properties which do not belong to the inferior compounds of which it is built up. The crystal of quartz has a shape which is the resultant of the mutual attractions and repulsions of its molecules; and the dog has a shape which is to be similarly explained, save that in this case the process has been infinitely more complex and indirect. Such, in brief, is the theory by which the vitalistic doctrine

of Stahl has been replaced. Instead of a difference in kind between life and not-life, we get only a difference of degree; so that it again becomes credible that, under favouring circumstances, not-life may become life.

“This brings us once more to the great question of *spontaneous generation*. Mr Spencer well says, ‘a tenable hypothesis respecting the origin of organic life must be reached by some other clue than that furnished by experiments on decoction of hay and extract of beef.’ The theory that an organism which is to any extent specialised in structure can arise directly from a union of unorganised elements, is ruled out of court. Such a conception, though it might be harmonised with the doctrine of special creations, is utterly condemned by the doctrine of evolution. So long as it was possible to believe that enormously complex birds and mammals were somehow conjured into existence, like Aladdin’s palace, in a single night, by a kind of enchantment which philosophers sought to dignify by calling it ‘creative fiat,’ it might well have seemed possible for animalcules to be spontaneously generated in air-tight flasks, or even for maggots to arise *de novo* in decaying meat. Such a view might have been logically defensible, though it was not the one which actually prevailed. But now, in face of the proved fact that thousands of years are required to effect any considerable modification in the specific structures of plants and animals, it has become impossible to admit that such specific structures can have been acquired in a moment, or otherwise than by the slow accumulation of minute peculiarities. Hence ‘spontaneous generation’ can be theoretically admitted only in the case of living things whose grade of composition is so low that their mode of formation from a liquid solution may be regarded as strictly analogous to that of crystals. And when the case is thus stated it becomes obvious that the phrase ‘spontaneous generation’ is antiquated, inaccurate, and misleading. It describes well enough the crude hypothesis that insects might be generated in putrefying

substances without any assignable cause; but it is not applicable to the hypothesis that specks of living protoplasm may be, as it were, *precipitated* from a solution containing the non-living ingredients of protoplasm. If such an origination of life can be proved, none will maintain that it is 'spontaneous,' since all will regard as the assignable cause the chemical affinity exerted between the enormously complex molecules which go to make up the protoplasm. No one speaks of 'spontaneous crystallisation,' and the ideas suggested by the use of the word 'spontaneous' are such as to detract seriously from its availableness as a scientific term. We need a phrase which shall simply describe a fact, without any admixture of hypothesis; and we may cordially recommend as such a phrase Dr Bastian's *archebiosis*.* That archebiosis must have occurred at some time or other is as certain as any fact in the history of our planet; and the following considerations will show that in its occurrence there need not have been anything sudden or abnormal.

"It is a well-established fact in chemistry that the simplest compounds are the most stable in the presence of heat. The simpler the compound the greater is the heat required to decompose it, or to prevent its formation when its elements are brought together. Thus the protoxides, which are the simplest binary compounds, can exist at a higher temperature than is compatible with the existence of deutoxides, tritoxides, &c., the molecules of which are more complex. The deutoxides, in turn, can exist at a higher temperature than the single salts, and these can withstand a greater heat than the double salts and supersalts. These, again, can maintain their integrity at temperatures which would disintegrate such organic compounds as alcohol or starch, while the latter will resist a heat far greater than that which decomposes albumen or fibrine. With a few trifling exceptions, such is the universal rule. And the significance of it is well illustrated when we

* *Archigonia*, Haeckel.

contrast some of the most stable protoxides, which resist the greatest heat artificially producible, with the protoplasm of raw meat or fish, which can barely withstand the temperature of a warm summer's day; and remember that the compound molecule of the protoxide contains but two or three simple molecules directly attracting each other, while the compound molecule of protoplasm consists of thousands of simple molecules arranged in systems upon systems, attracting and repelling each other in myriad directions at once.

"Now when our earth began its independent career the temperature of its surface could not have been lower, but may well have been much higher, than that of the solar surface at the present time, which is about 3,000,000 degrees F., or nearly fifteen thousand times hotter than boiling water. At such temperatures there can be no formation of chemical compounds. At the outset, therefore, our earth's surface was composed only of uncombined chemical elements, or free oxygen, hydrogen, nitrogen, carbon, sulphur, &c., and of iron, copper, sodium, and other metals, in a state of vapour. After long ages of cooling by radiation, protoxides began to be formed; then, after still further lowering of temperature, the higher binary compounds came one after another into existence; after these came salts and double salts, and still later ternary and quaternary compounds. And all this chemical evolution must have taken place before the first appearance of living protoplasm. So much may be regarded as certain, being a direct deduction from known properties of matter.

"When it is asked, then, in what way were brought about the various chemical combinations from which have resulted the innumerable mineral forms which make up the crust of the globe, the reply is that they were primarily due to the unhindered working of the affinities of their constituent molecules as soon as the requisite coolness was reached. As soon as it became cool enough for oxygen and hydrogen to unite into a stable compound, they did unite to form vapour of water.

As soon as it became cool enough for double salts, then the mutual affinities of simple binary compounds and single salts, variously brought into juxtaposition, sufficed to produce double salts. And so on throughout the inorganic world.

“Now in accordance with the modern dynamic theory of life, above briefly alluded to, we are bound to admit that the higher aggregations of molecules which constitute protoplasm were built up in just the same way in which the lower aggregations of molecules which constitute a single or double salt were built up. Dynamically the only difference between carbonate of ammonia and protoplasm, which can be called fundamental, is the greater molecular complexity and consequent instability of the latter. We are bound to admit, then, that as carbonic acid and ammonia, when brought into juxtaposition, united by virtue of their inherent properties as soon as the diminishing temperature would let them, so also carbon, nitrogen, hydrogen, and oxygen, when brought into juxtaposition, united by virtue of their inherent properties into higher and higher multiples as fast as the diminishing temperature would let them, until at last living protoplasm was the result.

“In view of these considerations we hold that the evolution of living things is a necessary concomitant of the cooling down of any planetary body which contains upon its surface the chemical constituents of living matter.”—JOHN FISKE, *N. Y. World*.

It appears, upon careful thought, quite possible that to the jelly-like *condition* of matter alone may be ascribed the phenomenon of life; that we need not attribute any special properties to the oxygen carbon, &c., of which we are made, but perhaps it may be the fact that on this planet, conditions of attraction, light, &c., are such that only these substances can assume the colloidal state. In other worlds perhaps it may be the metals which are alive, while oxygen and carbon form the dead rocks. Perhaps there exist stars where there are

fishes of copper swimming in quicksilver seas, and there may be birds with muscle and brain of gold building their nests in trees whose sap is liquid steel.

And thus it might have been a question in the early times, when the sixty-three elements first sang together, which of them it was that should be best fitted to play Harlequin and Columbine upon this sublunary stage.

And Oxygen and Carbon were elected and shortly began rehearsing their parts, and you might have seen their preliminary play in the wide fields of the carbonates which down among the granite crags began forming; those of the carbonate of ammonia appearing at last would have told you beyond a doubt what style of drama the earth was to be the theatre; it would have told you that terrestrial life was to be an airy and a diamond life, and not one of gold or iron.

Take a sniff of your smelling salts, then, as a conception of the prologue, and let us raise the curtain on the opening historic scene.

A DIVISION OF LABOUR.

“See that protozoa—a mere gelatinous speck, floating about in the water. It seems to have no life, no will-power, no object—a mere accident here, floating amidst the busy hum of life—an impediment to progress. Push it aside, it can do nothing; it has no roots to draw nourishment, no leaves to breathe the fragrant air, neither has it a mouth to eat with, feet, fins, or wings for locomotion, nor hand to help itself with. Drifted about by every ripple, it can only live where the water is almost dead and still. But wait, there is a prolongation of one of its sides toward a minute speck; the prolongation now becomes an arm, and a hand is extemporised and the speck is drawn in, but what is it going to do with it? It has no mouth to eat with, no stomach to digest food, nor has it a little rootlet by which it can draw in the nourishment for its higher development. If it were only either animal or vegetable it could use the little mote it is drawing in toward

itself. But like the dog in the manger it can neither use it itself, nor will it allow others who would appropriate it to good uses to use it. But wait a moment. Now it has drawn its tiny aliment to itself; but where is its mouth? Oh, now we see; it becomes all mouth for the occasion. It spreads itself out, draws its aliment closer to its embrace, and proceeds to envelop it, whilst it undergoes the process of mastication; now its mouth has developed into a throat, and now it seems to undergo the process of digestion in an extemporaneous stomach. Who shall say that previous to reaching forth an arm for the nutriment necessary to the continuation of its unimportant existence, that the protozoa had not extemporised a brain with which to think, and reason what was necessary for the support of its vitality.

“Thus while we perform the several functions here mentioned, by different members, created apparently for that purpose, the protozoa performs all these functions with one member, adapting itself to the conditions necessary to secure the ends designed to continue its existence, and propagate its species, if any it has.

“The human family are well illustrated by the protozoa. In the savage state we make our own bows and arrows, kill our own game, work the skins over into our own garments, carrying our wigwams along with us; whilst in the civilised state we have a trade or profession for each department, as we have organs for each function of our bodies. In time there will be still greater subdivisions, until one family shall not even cook their own food, or heat their own rooms, that being a separate occupation, which can be done cheaper, as a separate business.

“When we divide the protozoa, we find each particle is capable of sustaining itself in the same way as was the whole mass. And the business of becoming at one time all brain, and again all arms, and anon all mouth, and then reconstructing itself into a digestive apparatus—only to revert back to former

conditions when circumstances shall demand—will go on the same as the other.

“Now, if it were possible to raise this little sarcoid to a higher condition, we should find a prolongation on each side, drawing in such nutriment as happened to float near it, and absorbing as above described. In a few generations, if it were to acquire the power of reproduction, as it certainly has, these prolongations would then become fixed facts, really a necessary part of its existence; its food should then pass beyond its reach, the adaptation of the food to the wants of the animal would create a species of attraction, which, not being strong enough to draw the aliment immediately within the reach of the little animal, would cause an effort in that again which has the higher manifestation of life, to attain its necessary victim. The result would be a slight prolongation of the arm nearest the object, and a corresponding contraction of the other. This would tend to turn the little voracious speck around with its other side next its victim, and thus it would continue, till in time its arms became little paddles by which it moved around. This motion would tend to throw one end of the animal next its food, and a mouth being extemporised here, and being in constant use, would from the force of habit become in time a fixed fact.

“If now we were to divide this little mass into several pieces, we should find that each one would assume the shape of its parent, and we should only by so doing turn loose a greater number of carnivora upon the helpless little lives around them. This process of arrangement would, however, continue, until we should have a stomach and intestines, and then lungs, liver, kidneys, &c., until we had all the necessary secretions for each department of its little being. It is impossible to trace the development of perfect organisations back, of course. We can only trace possibilities, and conjecture probabilities.”
—*Science Journal*.

LIBERTY, EQUALITY, FRATERNITY.

That Utopian dream, like our dreams of sweet and guileless infancy, is a retrograde ideal. Some people seek mental pictures as antiquarians do painted ones; the older and more imperfect they are, the more highly they are prized.

Liberty.—Protoplasm! slimy cells scattered all over the bottom of the sea; one of these primitive egg-white cells could go where it pleased—and had no work to do; a happy lot! Now-a-days there is not a living cell in the body of any animal that is not born and developed a most abject slave.

Equality.—In the olden times all were equal; no one had better food than another, or a thicker membrane to protect it. In these aristocratic days there are cells in the philosopher's brain that have a diet concentrated from the finest viands which only world-wide labour for millions of years was sufficient to produce, a diet one drop of which is more costly than a whole ocean of the monad's fare. And as for

Fraternity, these same aristocrats would not for life own to a forty-ninth cousinship with even the best of those lower animals which die that we may live—the humbler cells of creation which die that ours may grow superior to them.

Our teachers sometimes confound the would-be communists, by presenting a fictitious instance of an equal distribution of property, saying, that if every man to-morrow morning should find himself possessed of "just one thousand dollars," before night, some would be penniless, and others millionaires. This telling argument may possibly be refuted; but the argument that history gives cannot be refuted. We there see that all were indeed created free and equal, and that they remained comparatively so for ages; but that, as the great natural forces of the earth grew stronger, gradually a divergence began which must ever continue to make more classes and wider distinctions, and to make them with increasing rapidity, until the degeneration of life. Neither can natural divisions be obliterated by human fictions. Even the democratic device

of labelling a first-class car, "Pulman Palace," instead of first-class, and calling the middle-class coaches first-class, without marking them at all, will not change the reality. You know just as well when you buy your ticket that you will find "men of the world" in the Pulman,—the common every-day sort of people, commercial travellers, and well-to-do rustics in the other, and the labourers beyond, as you know it in Europe, where you pick out, in mounting the train, your first, second, or third class; and everybody knows and feels that such distinctions are each day becoming more clearly marked, instead of being effaced.

Three words will convey to you, in a summary, all the aspects of this genetic era, this era of the opening of life and beginning of society :—

Liberty, Equality, Fraternity.

This is the sensational language. In the scientific it is—*Incoherence, Indefiniteness, Homogeneity!*

FARMER AND JOURNEYMAN.

Years pass, the Utopian dream is over. Differentiation has already begun. It needs only the application of the every-day rule, that some children stay at home with the old folks, and that others go abroad to seek their fortunes, to set up a distinction of class as radical as the world can produce.

The old homestead! the old farm upon the sea's-bed, the parents, good old farmers in the most literal sense, drawing their nourishment straight from the soil; and they are rooted in their place. The children, being the image of the parent, are also rooted, and, it happens, generally rooted upon the parent; and the grand-children become rooted on the children, and a whole colony of rooters grow up on the old farm—a genuine agricultural society.

Others of the children, meanwhile, are torn from the paternal embrace, or perhaps never had any paternal embrace, coming up like the *gamins* in a great city, from nobody

knows where, and like them, forced early to fight the battles of life as best they may; and they are storm-tossed and at their wit's end, which, it must be confessed, is much sharpened in consequence. They grow shrewd and nervous; they journey far away from the old farm to the very surface of the ocean, and there, in the brighter air and lighter waters, they float and seek for food. They mature, and their children increase; they lose the rooting tendency of their forefathers, they are vagrants instead of parasites, and their children, being like themselves, are thrown clear cut into the world, free from all encumbrance. There is a race at the top of the waters at last, as well as one at the bottom, and the two are different.

It is the story of country and city life. In the former, the dwellers peacefully eat the products of the soil; in cities like New York, heavens! they eat each other.

THE FOUR TYPES OF ANTIQUITY.

When the Aryans first arrived on the shores of the Baltic, they were a homogeneous race; now they are Germans, Englishmen, and Americans. So in the ancient times, differences must have arisen among the early races of which I have spoken. As for the oldest of them, however, the old farmers, there is but little change; year after year they live much the same, and their children follow in their good old footsteps; new territory is needed for the rising generation, and finally, the entire globe—such of it as is under water at least, for they have not yet learned to live out—is occupied; but the habits of this primitive people have not changed, nor will they greatly change. They get their living too easily to make much progress, for hunger is the drive-wheel that carries us on to greatness. We may name them the agriculturists, the most venerable of races, and we will turn our attention to the others.

THE LILIPUTIANS.

It is among those surface dwellers, where subsistence is

precarious and motion a necessity, that we find hardships, struggles, and consequent divergence of character. It is here that history must give an account of *the first war* of the world. What is war? "It is the expression of the base bad passions of man, instilled into him by Satan, you reply." It is my duty to supplement this reply by the information, that those passions are nothing else than the pangs of hunger ; that the war which the lion makes upon the lamb is the type of all war, and the millennial spectacle of the two lying down together, can never be witnessed until the stomachs of both are everlastingly filled.

Let us see what history has to say upon the subject ; let me try to picture the first war.

I have already told you something of the incredible rapidity with which life multiplies itself. Now, let us suppose that at the time I am speaking of, where now is the continent of Africa, there were only scattered granite crags, but that all the intervening space was filled, as it must have been, with small aquatic animals, filled so thick, that there was scarcely swimming room. Suppose next that there should be an emigration of larger animals from America, there would necessarily ensue a war of extermination, and after many years the African continent would be made up entirely of those larger people, the conquerors. That the tale of the poor Indian in America repeats this history on a larger scale, is too evident to need argument. History ever repeats itself. The explanation of all war, then, philosophically may be cyphered down to two statements—a strong race hungry ; a weak race in peril.

Amid all the mighty struggles of which the earth has been the theatre, figures are utterly inadequate to count the fallen ; not individuals, but the whole races that have been engulfed for ever, while the few favoured ones are preserved. The little people that I am to speak of, the Liliputians, are a feeble folk ; how have they survived ? They have hit on the expedient of constantly outnumbering their enemies. They

are the precocious ones, the race, every individual of which, assumes in childhood, instead of at maturity, the responsibilities of parent. In the earliest infancy of such an individual all the little cells, instead of massing together, and going to build up the growing body, fall off and run away, growing up themselves into infants, so that in the end, when maturity is reached, instead of one large creature, there are ten thousand Liliputians; and thus, at the sacrifice, it must be confessed, of all ideas of grandeur and nobleness, their permanence is for ever established,—they can produce more men than their enemies can kill.*

THE HERMITS,

Now so insignificant, were once a great and powerful people; throughout antiquity, perhaps, the most important of all. Like the feudal barons, their house was their castle, and like them, in consequence, they grew haughty, conceited, and stupid. Springing up at the epoch when the first great wars were raging, and in the midst of the lime-stone strata, they took to a most natural mode of defence; impossible as it had long been for the cells of their organism to imbibe the necessary food without taking in along with it immense quantities of this indigestible lime-rock, they now began to utilise its particles; casting them outside continually, it could not be otherwise, in fact, than that they should gradually form a breastwork, and finally a castle or shell, out of which its master could issue for food, and into which it could retire when pursued. In these early days such a defence was all powerful, the pilgrim wayfarer and the simple peasantry easily fell victims to the robber baron, while the impregnable

* Or, on the other hand, perhaps, the cause of the diminitiveness of insects lies in the absence of a back-bone, or axis; they were heedless, and failed to raise a framework suitable for the purpose of a grand structure. They bear the same relation to vertebrates that grass does to trees, and for the same reason. Some grasses attain considerable size; so do some insects, the lobster, for instance.

lime fortress bid defiance to all the weapons and all the arts which the simple antagonistic races could bring to bear against it.

In this age the reign of the mollusc was supreme ; but now, mark the sequence ; being shut up from the outward world this great Mogul lost sight of the remarkable fact that the world was progressing ; he did not know that the slings and stones at which he laughed would finally evolve first to battering rams, and then to howitzers ; he never dreamed that there would arise races so powerful that they would lift him up bodily, castle and all, high in the air, and dash him down upon the rocks there to make a meal of him at leisure, — races so powerful as to split his castle in two, and use the lower half of it to dish its master up on, and take in a dozen of his kinsmen at a meal besides.

But stranger still is the fact, that as time rolls on, he becomes so dull that even in the very face of all this he cannot see the change, but declares steadily that the world stands still. If you could discuss the subject with one of these venerable oysters, you would find that, in imagination, he was still living in the days of old Siluria ; he would proudly talk of his high position as one of the nobility of earth, and declare that modern invention, the oyster-knife, to be what a certain Earl declared the railroad to be, a preposterous mistake.

Moral. Don't be Hermits ; remember that the world is not only turning round, but expanding, and if you don't expand with it you will be swallowed. Do not fancy, that because within your castle you are revered as an omnipotent by your wife and children, that the world so regards you ; the world is not an immovable block, with yourself seated on the top of it. You must look alive ; look alive, and read the newspapers in these days, if you do not want to be caught napping, and taken in. It is he who reads not only the papers but the books, and knows which way the *scientific* wind is blowing, that will be enabled by precept and example to fit his children

for success in the keener competitions and severer struggles of the Future. I will conclude the study of the antique age with an account of another people, whom I will call—

THE GRAND MOTORS.

“*Ingenii largitor venter.*”

It is by their ability to generate a greater amount of motion that the higher animals are distinguished from the lower. The motion generated by molecules is petty ; that by cells and organs, greater ; that by a great complex organism like a man is something prodigious—one swing of the arm of a man does more execution than a day's labour of a whole army of the Liliputians, the insects. The fall of the “genial shower,” which, though it may extend from the Atlantic to the Pacific, and contain a thousand times the amount of water, is insignificant compared with the crash and the roar of Niagara, and so would the movement of half an ocean of worms be when compared to the motion of a voracious shark. Towards the latter part of the Acranian age, down upon the earth's equator where the battles were the severest, there gradually grew up a race differing widely from the three previously described ; there was no tendency among them to aggregate into long dull agricultural colonies like the first parents ; they were not like the precocious ones, which, from the accident of an over-mature childhood, were destined ever to remain children ; they were not barons either, no noble blood in their veins, no marble in their constitution to build fortresses of. Their chief characteristic was an insatiable appetite. “Eat and grow,” might have been an appropriate motto to inscribe upon their banners, and their rallying cry was that of *Oliver Twist*,—that most tremendous word,—*more*. MORE—that word is the grandest inspiring cry on earth ; it is hunger which makes kings of beggars, an empire of a paltry fief, statesmen of slaves, poets and philosophers of low-born peasants—I dare not tell you half its consequences, when it has once taken possession of the

man, and becomes the "stern tyrannic thought." A boy, yearning for literary fame, once wrote to a great author, asking what was the best preparatory training he could take to insure success; and the reply was, "That you have a sincere *ambition*, is the best preparation." Depend upon it, it is hunger that does the business. If I were to write a complete history of civilisation in a single word, that word would be *hunger*.

I need not dilate on the early history of these voracious; it is enough to say that they were insatiably and hopelessly hungry, that, being hungry, they ate, and grew large and larger, and the larger they grew the hungrier they were, and everything that they got was quickly invested in sure speculations to bring them more,—from their beginnings, as plain tissue, they raised first a sanguineous scheme, and then a muscular scheme, and then a nervous scheme, and then they linked them all together into a grand monopoly; and woe be to the Liliputians and the Hermits and the Agriculturists, when the Grand Motor showed his face!

Woe be to worms, snails, and weeds, when the first fish, all headless and finless, though he were, had grown fairly up, and scattered his posterity through the waters.

A FEW REFLECTIONS WHICH MAY SERVE AS A BASIS FOR YOUNG POLITICIANS.

If the dull routine of labour were the road to success, the Heathen Chinese would be our master. If the "nobility" and the old barons could have continued their way, we should still be amid the grim shadows of the dark ages. If children could rule the world, the East Indian, not to say the Latin, would hold the planetary helm. But no, it is the hungry Saxon, with his eternal cry for *more*, whose lightning and whose steam is destined to run the sublunary machine for many a long year to come, perhaps to the end.

“Be virtuous and you will be happy,”

is the oldest and best of maxims ; but a new one give I unto you, to be a companion for it—

Be hungry and you will be great.

Napoleon Buonaparte, Julius Cæsar, and Mahomet furnish us examples. Rothschild and Jacob Astor furnish us with examples. Horace Greeley, Isaac Newton, and Socrates furnish us with examples. King-of-the-sea Shark and Monarch-of-the-forest Lion furnish us with the most unmistakable of all examples.

[Remember that *Nature is one*. A rule that works in the digestive Archæus, will work in the Psyche,—a law of the stomach is also a law of the brain.]

CHAPTER VI.

THE FISHY PERIOD.

AGE OF THE FISHES AND THE FERNS—A REIGN OF SHARKS—
DURATION THIRTY MILLION YEARS.

How we created a back-bone—How we came to have four limbs—And
what we know of Swimming—Muddy aspirations, &c.

AN UNINTERESTING FISH.

“FISH form the fourth class of vertebrate animals, and as a general rule they live in the water, although in Ceylon and India there are found species that live in the earth, or at any rate are able to exist in mud, not to speak of some that are said to occupy the trees of those countries. A fish breathes by means of his gills, and progresses chiefly by means of his tail. This animal is admirably adapted for progressing through the water, as may be seen from its form, which has been imitated more or less closely by the builders of ships, the makers of weavers’ shuttles, and others.”

A VERY INTERESTING FISH.

“At a still earlier period the progenitors of man must have been aquatic in their habits ; for morphology plainly tells us that our lungs consist of a modified swim-bladder which once served as a float. The clefts on the neck in the embryo of man show where the bronchiæ (gills) once existed.”—*Descent of Man*, vol i. p. 198.

If the body of a worm or an insect be examined, it will be found to be composed of a number of joints ; the bough of a

tree is seen also to be made up in the same manner ; so also is the vertebral column in man, and each of his limbs—from shoulder blade to the end of the digits, is a string of segments. This jointing or dividing process seems to be universal : wherever there is a spherical organic aggregate, it splits into rays ; where the shape is cylindrical, it divides into segments. How is this process accomplished ? Is it like any of the mechanical processes of which human beings avail themselves ? The possible division of an apple into quarters, the operation of the cook in kneading the dough into a long roll and then cutting it into equal parts, the manufacture of pills by the apothecary, each is the same operation reduced to a science. There are appearances which indicate that nature sometimes works in this way ; the lower worms are as even and perfect as a lead pencil ; the higher ones, from the earth worm up, are like a string of beads. What is the next step beyond this in development ? If we look at a beetle or a crab, nature seems to have undone her work ; the segments are united again. This, too, has its analogue among the creations of man. I have a picture of the first coach, it is a long box like an omnibus. The European coaches are divided up into compartments, which is a progressive step, and if we look now at the famous American drawing-room car, we see matters reduced to unity again,—yet it must be observed, a much higher unity than the first. These successive stages are known to the physiologist as integration, differentiation, centralisation. This separating and uniting only to again separate and again unite more perfectly, is the rule throughout nature. These two operations make the form of everything—the limb of an animal, the limb of a tree, and the frost branch on the window, grow in the same way. The division of one drop of water into two drops, the cracking of a sheet of shellac or glue, the separation of one infusory animal into two, of the caterpillar into rings or segments, the farther separation seen in the cutting between stomach and abdomen in the butterfly and wasp,

and the tendency toward the slender waist in woman, are all due to the same law. The six fingers we sometimes see, and, in fact, all fingers, show the first process; the Siamese twins are an example of the other. When this latter is complete, it makes two or more individuals; when only partial, the result is a chain of segments. Thus are formed the segments terminating in the limbs of the insect.* When these limbs once appear, their future state depends chiefly on the use to which they are put. Those that are not used at all slowly die; others are modified into strange diversity; every possible protuberance appertaining to an insect, upper-jaw, under-jaw, claws, feelers, jaw feet, and regular feet, were all alike at the commencement, having all developed from these simple sprouts which shoot out from the segments as do the crystals of a snow-flake on the stamens of a flower. By these two processes, jointing and sprouting,† the individual is formed, and adaptation to circumstances does the rest; but this crystallising tendency, these laws of the drop of water dividing into two drops, these laws of the needle sprays which shoot out from the freezing crystal, and which in a flower form its petals, must precede the facts, that we inherit the qualities of our parents, and that we are modified by surrounding circumstances. The formation of so curious a thing as the back bone with its ribs, or the growth of an arm, cannot be accounted for otherwise. In short, the laws of life must be reduced to the laws of mechanics.

* "The fact appears to be that in certain masses of organised matter, on their reaching a certain limit of growth 'polarities,' which were hitherto held together in one system, break up into two, and so on. The simplest case of this is cell-division; but whether the systems separate entirely, as in simple fission, or remain associated, as in the cleavage of the egg and the segmentation of the annulose, depends on another factor, a cohesive or integrating power proper to the growing man."—E. RAY LANKESTER, *Nature*, April 4, 1872.

† Divisio, Gemmatio.

THE INSECT AHEAD.

By the operation of these laws, the flower-like infusorians, became vermes, and the tiny animals being thus provided gratuitously with any number of feet, straightway began to use them in walking about on the bottom of the sea, where there was plenty of food. What a precocious set of fellows these worms were to be sure ; their thousand little feet had travelled over every spot of the globe, habitable and uninhabitable, millions of years before the first fish had sprouted a fin ! Truly the caterpillars were the first discoverers. Their descendants, the butterflies, and the ants, and the bees, were destined to rear a perfect civilisation while man was yet an idiotic savage without the power of speech. Let man be proud of his predominance at present, but the insects, little intellectual giants as they are, have led the van in the course of progress on this planet.

To the other great class of animals, however, we have now to direct attention, for here we are more interested. Toward the close of the Silurian Epoch, near the surface of the great oceans a little lance-shaped body might have been observed, differing from the great social organisations around it,* to which immense numbers contributed as prey, differing again from the Hermits, who, where they were not masters, by their stern fortress, were at least safe from harm. These animals had no fortress, they were soft and sack-like, and hence did not divide into segments ; but as generation after generation succeeded, the race might have been found to have increased largely in *size*. Here then, after fifty millions of years a new growth is evolved, combining great size with great motion—the sea was filled with fish. Not like those of the present day, but without head, and with a round hole only in place of mouth ; great overgrown oval worms in fact—just what the insects had been ages before on a smaller scale.

* Algæ, Echinoderma, Zoophyta.

From the large size of this new type the secretion of hard matter does not occur on the exterior as readily as in the interior; bone takes the place of shell. The body gradually elongates by persistent motion forward, the organism is completed, the animal is a fish.

HOW WE CREATED A BACK BONE.

“Plants rear themselves up joint upon joint, and finally terminate with the flower and seed. In the animal world it is the same. Worms are made up of joints, and at last build themselves a head. In the higher animals, and with man, it is the vertebra (the back bone segments) which thus follow each other and close out with a head, in which is concentrated their force. That which we find true of individuals is true of whole corporations; the society of the bees, also a chain of single individuals, bring up at the end a concentration which is seen to be the head of all, the queen-bee. . . . After the same fashion also a people brings forth its heroes, which shortly, like demigods, appear standing upon the summit of humanity.”—GOETHE cited by *Haeckel, Gen. Morphologie*.

We have here an undertaking of considerable importance. I am going now to make for this fish *a back bone*.

There are two methods. The Germans raise it by agriculture—a stem building itself up joint upon joint. The English produce it by manufacture. A glacier is cracked across by flowing between rocks; a rod of metal may be broken up by bending backwards and forwards.

The Germans are naturally farmers, the English mechanics; we should expect that each would work in his own way.

Which is correct? Did the fishy fellow, by active, extensive, and varied wriggling, unintentionally break himself up into short bits, or, on the contrary, did he lie for a million years sluggish and quiet, like a moist potato field, and suffer the

germs within him to sprout and grow up into a curious segmented tree?

Was *Piscis Primogenitus* a Spencerian or a Goethian?

You know what happens when a string is suspended in a bottle of alum water; you have seen the formation of the lead tree under similar conditions; thus also grew the vertebral tree.

Fancy a bag of salt mother liquor (protoplasm) hanging in the ocean. Exactly in the centre appears the first crystal, the germ, the parent vertebra; two juvenile crystalline buds are soon seen upon the parent, they sprout and grow in opposite directions. Perhaps, however, the crystallisation proceeded from one end (the aboral) only. Pluck two simple shoots of any kind in the orchard and place the broken ends together; such now, as I see it, is the form of the back bone; the internodes correspond to the vertebra.*

It is observed that simple shoots in their growth finally branch out. Here too the analogy holds; such side branches are, on the lower half the ribs, on the upper the shoulders, jaws, tongue, gills, &c.

Our vertebral tree is, it is true, rather one-sided. This is owing to position—"just as the twig is bent the tree's inclined,"—this tree has grown standing horizontally instead of upright; counterbalancing limbs are seen, nevertheless, in the wings (of the insect), horns, and the ear. The ears are little ribs, so to speak, sprouting on the wrong side of the spine, and upward in the head instead of downward into the stomach.†

How strangely unlike also are the two ends of the vertebral tree, the poles of the organism, become! yet so have the ends of all other trees. Pull up one and compare Messrs the Rootlets with Mesdames the Flowerets. Dear me! how we *are* the victims of circumstances! When these began life, both were alike;

* More likely a *single* shoot represents the true analogy.

† Consult Huxley's *Anatomy of Vertebrated Animals*, p. 71, Appleton's edition.

one took to digging in the earth, the other to sipping sunlight; compare them *now*. How we *are* the creatures of habit! Try it, my reader, thou who art, remember, immortal; cultivate the first cardinal virtue for a hundred thousand years, and see what thou canst make of thyself.

HOW WE CAME TO HAVE FOUR LIMBS.

Thus our piscean creation is finished and perfect. Ages pass. What is the matter with our protégé? will he not “stay put?” didn’t we have him properly fixed? does a fish not progress by means of his tail? What is the meaning of these four odd looking protuberances bulging out upon the lower side? what sense can there be in such an innovation?

The incapacity of *natural selection* or of *adaptation* to account for incipient structures is best exemplified in the growth of the limbs. If we look at an eel*—a long, oval, and perfectly smooth body—and then regard the next higher animal, the shark, with his four beautiful fins, we are at a loss to know how the latter came by them; surely no amount of wriggling would make fins grow. And again, no amount of killing those who hadn’t fins would create them when there were no signs of a tendency to such growth. Surely by no freak of nature would at this opportune moment a happy deformity be produced which “Survival of the fittest” might have taken advantage of. And why above all things should the number be just four? Six would have been much fitter for a race of long fishes like the sharks.

One thing is certain, these limbs of fishes and of higher animals are *either* the result of an accidental freak of nature, like the protuberance of the pouter-pigeon, or they are metamorphosed ribs, or they are independent branches—sprouts which must, further, have had some good cause for putting forth in this four-membered symmetry. Now, when we

* That is, the *Cyclostoma*.

examine a fish and see the delicate rudimentary ribs, scarcely visible and growing close upon the spine, and then look down at these broad ventral prolongations, the idea of there being any connection cannot take form.

If, on the contrary, we regard the body of the fish as an inverted saucer with the two edges lopped down and joined together, the four flaps thus presented at each end of the seam are as good a basis as natural selection could possibly ask for. We hope yet to win Mr Darwin over to our beautiful cup-and-saucer theory. True it has many drawbacks, the chief one being that most of the facts are against it. A fish after all is a good deal more like a tube than a cup, and it is more like a fish than like either.

We must delve deeper. From a pack of cards select the ace of diamonds; for the purpose of experiment suppose this ace to be the diagram of a little animal—say a leech or a juvenile tortoise, sprawling upon his belly. The four corners of the diamond are four poles. Do you remember in the philosophical class how the professor whirled a tin globe to show us why the earth was flattened at the poles and how *it bulged out at the equator*? “It was the centrifugal force did it,” he said. Now is there not between the poles of this diamond, that is, upon each of the *sides* of the quadrilateral figure, a capital chance for just such a swelling, if the proper force were applied—for four such swellings? The required force is the life-current—the vital-centrifugal.

A soft sphere, two poles, one equator, the centrifugal force—result, an oblate spheroid. A soft diamond, four poles, four equators, the same force—result, a four-limbed endi-pleural pyramid (shoulder and hip are pectoral and abdominal equators).

The proof.—Observe when next you pass the fish-market a transverse section of the halibut (made, as it often is by fish-mongers, near the tail of the fish), do not be afraid or disgusted if you are a lover of nature; you will be more than repaid

when you find the most beautiful diamond in the world. The four poles perfect, and the four equatorially swelling bundles of white muscles plainly delineated. Was ever so beautiful a crystal? *

IRONCLADS.

“The sharks must have presented every variety of size, the largest probably attaining a length of nearly fifty feet, with mouth and stomach sufficiently ample to take in three men at a single swallow. Many of their teeth are found in the phosphate beds of South Carolina, as large and as thick as a good sized smoothing-iron (flat iron), and of the same shape.”

In the constant struggle for life that is going on, only those races can survive who attain some high quality which is not possessed in an equal degree by others. The German race, at the present time, is characterised by a marked degree of intelligence; the Saxon, by energy; the French, by persistent love and cultivation of the beautiful. In the epoch we are describing, the four successful ones were the *weeds*; those modified worms, the *crabs*, *molluscs*, *fishes*; the crab saving his neck in the race by his crawling propensities, the oyster by his impenetrable shell. The fish, by his swiftness and large size, is able ever to take the offensive; henceforth he will increase while the others must decrease.

The multiplication of fishes during the thirty million years of this period must have been enormous; every foot of water on the globe being taken up by the finny tribes, while whole legions of inferior races of animals must have perished before the face of the ravenous enemy. Of course it would be impossible, too, that the conquerors themselves, being variously conditioned, should remain, during this period, with a nature

* These bundles are not, of course, the rudiments of the limbs, nor have they any connection with them; what you view is upon the *long axis*, the limbs grow upon the *broad axis*; the principle, however, is the same.

entirely unenlarged ; many, it is true, being situated in comfortable localities, where food was plenty, continued in the same old eel-like way, generation after generation ; but others, having acquired fins, became sharks—the carnivores, the monsters of the deep, driving all before them, while the smaller fry, being driven near shore, and having to take their chances with the snails and crabs, speedily acquired a covering, proof against the raps of hard breakers and harder enemies. All animals, as shown, have a tendency to secrete a hard substance ; and when their life depends on this secretion, it will gradually be increased by the death of all the softer, those possessing the power in a lesser degree. Only iron-clad and zinc-covered trunks are seen on the western American railroads, all others being smashed up by the remorseless pitching of the baggage-men, employed it would seem for the purpose ; this is the “survival of the fittest.” One must not imagine, by the way, that the fish at this time were like the finely-cut, swift, beautiful little creatures that we see at present ; on the contrary, they were slow, clumsy and misshapen in comparison ; perfection is only reached by time. The fossil fishes that fill our geological works would be a shock to Isaak Walton.

Out of the plated fish grew the “fish with glittering scales ;” square scales at first gradually growing rounded, the fins at first equi-distant between the poles, gradually changing position, the posterior ones coming more to the front. The swimming bladder, first acquired by accidentally swallowing a bubble of air, becomes now a permanent organ, a closed sack.

Thus, from such a swimmer as the shark royal, we get a higher order like the herring, and from this the still higher and very beautiful perch. Other modifications in different directions make the funny little water-horse, with his tufted gills, and on the other hand, that misshapen creature, the flounder.

MUDDY ASPIRATIONS.

The homogeneous ever tends to become heterogeneous. In the beginning we had a single class of the grand motors to deal with. We have, as we approach the close of this piscatorial age, three classes.

Out in the deep water, the large but simple and crudely-formed sharks, with their still more simple ancestors, the eels.

Toward the shore, and in the inland lakes, the smaller fry, with their heavy coats of armour—the turtle-fish and the sturgeon.

Over the great face of what is hereafter to be the earth, inhabiting another element, neither land or water, but a mixture of both—the curious mud-fish, slippery kind of customers, bad swimmers, good smellers, froggy, experimental, discontented.

There, in the dismal swamps, this latter horde of malcontents grow daily more numerous, and more clamorous. Living in the mud, the idle fins hang like strings by their sides—a more wretched condition can scarcely be imagined. True, a portion of them finally grew fat on the questionable diet, and the useless limbs were again brought into play, becoming a sort of mud paddle or flipper.

Thus was formed a veritable fishy-dragon, and another branch of the family, a snake-dragon, both of whose remains have been found in geological strata of the following epochs.* The rest became tadpoles.

Do such transformations seem improbable? Not when we think of the grand element of *time* as we should; such stupendous changes do not occur suddenly; nature never goes by jumps; animals do not change their form like dancers at a mask-ball. Take a good look at the pretty Italian greyhound by your side. You have the certainty that four thousand years ago, the docile, slender animal was a coarse, shaggy,

* Ichthyosaurus Plesiosaurus.

ravenous wolf. Now, if you continue the education in the same direction three thousand years more, and then ten thousand, and then a million, what result could you not expect? Yet here we are dealing with a space of time equal to thirty millions of years at least—a time sufficient to transform a race of worms into a race of elephants.

It would seem at first, perhaps, that the argument proves too much; but progress in these early ages was exceedingly slow; a hundred generations then might pass, and the latest children show no perceptible difference from their forefathers. Now-a-days transformation is indeed rapid. Compare the shrewd business-man of Gotham with the fat, stupid beer-drinking Dutchman of eight generations ago.

What an experience it is to look back to those days when the world was young! To all the higher animals up to that time the water ocean was the only world; yet gradually another element had been preparing; rocks had crumbled down to dust, and water had mingled with it, and the sea weeds had found a lodgment, and vast weed forests, stretching up into the gaseous ocean, half vapour, half air.

Here is at last another world more strange to the finny tribes than was the western world to our European fathers; yet the worms and the insects, with their many feet and gradually-growing wings, has already penetrated and possessed it.

"Thus the creeping things were made to rule the land, and the back-boned animals to rule the water," might have written some simple, old primitive philosopher, if he could have witnessed the scene, thinking to measure great nature by his own puny stature.

"But will the fish take to the land? Why should they? How absurd!" says one. Certainly they will not, unless stern necessity compels them; yet the thing is not so strange as it would seem; already large colonies are settled in the muddy shores, that half-and-half element which has so changed their natures. Many are already of a froggy lizard-like dis-

position ; it will take but a step ; if some magic power could endow them with feet to walk with, large lungs to breathe that rare new element, the air, it could be done.

We must not forget that here, in talking of land and water and air, in these early days, it is merely out of compliment to the face of nature.

If in our mind's eye we take our stand at this time in the centre of the great American continent, we shall find our heads in a London fog and our feet not on *terra firma*, but in an ocean of mud ; instead of the air, earth, and water, we have vapour and rock and mire ; one must visit the vast swamps of Florida to appreciate a landscape of the coal age.

Mud then is the element to which our attention is to be directed. Let us take a case ; with every rain that falls, the Great Salt Lake is filling up, every stream pours its quota of dirt into it ; it is a necessary conclusion that some time in the ages to come, where now exists the Great Salt Lake, there will be but a swamp, and still later a plain or woody valley. Now, what will become of the animal life now found in that lake as this transformation progresses ? What will become of the fishes when this water thus gradually becomes land ? Certainly one of two things must happen ; they must either become utterly changed in their nature themselves, or perish. Which will it be ? Probably both—the brightest and best formed and more perfect will die ; such fish as the perch and herring, with their perfect swimming fins and compact bony skeletons, could never adapt themselves to such changed conditions, but there are other fish than these ; there are fish whose skeleton is only gristle, easily modified, whose fins are flabby and membranous, almost as well adapted for paddling in the swampy slime as for swimming in bright water ; such animals will survive. As the water becomes mud, they will become tadpoles, frogs, and when water is no more there will be found animals like the toad and the lizard, as well as trees and grass, where once were fishes and sea-weed.

We pass over some millions of years again with the seven-leagued boots, as a writer of history would pass the thousand years of the dark ages, with only a meagre remark upon Charlemagne and Abelard, hastening to dwell on the more fruitful civilisation of the following three hundred. Fifty million years go by ; half the time since the beginning of life, and only that low order, the fishes, developed. Well, a thousand years from the fall of Rome were required to evolve the embryo printing-press, a miserable wooden block, while three hundred only sufficed to transform that block into a Hoe cylinder. The beginning of all things is slow—the more progress already made the faster must progress go on ; life is fast in these later days, hence a fast life is natural. The energy, the power of doing work of any force is as the square of the time during which it has been operating ; a cell of the nineteenth century is a very different sort of workman from the cell of the Carboniferous Epoch. In the beginning it took fifty million years for the cell to grow to be a fish, now it takes but twenty years for a cell to grow to be a man. There is mathematically ten thousand million times as much energy in the cell life now, as in the good old times.

“THINGS TO BE REMEMBERED,” AS THE SCIENCE PRIMERS SAY.

1. We creatures of flesh and grass have two homes, one in the ocean, the other upon earth. In the former, the old home, we have passed no less than seventy-five per cent of our existence, and in the present one the remaining twenty-five per cent.

2. From this it follows that the body, and hence the mind, of both plants and animals must be largely and fundamentally made up of aquatic impressions. Psychologists please take notice.

3. I cannot with my scalpel find anything in the highest quadruped that is not in the fish. I am not too conservative ; lovers of antiquity inform me that they find nothing in the

civilisation of the nineteenth century that was not perfectly comprehended by Plato and Aristotle.

4. The phrase Mother Earth is a misnomer. It is the earth's antagonist, Ocean, the untamed, which is our generatrix.

5. The "History of Nations" may be divided into two periods; Aquatic History, and Aërial History. A third and final section, Petrous History, will never be written by man.

CHAPTER VII.

THE REPTILIAN AGE.

YOU MUST CREEP BEFORE YOU CAN WALK—THE CREEPERS—
ELEVEN MILLION YEARS' REIGN OF THE GREAT DRAGON—
THE STORY OF A MOST MISERABLE LITTLE LIZARD—HOW WE
MADE FIVE FINGERS—INVENTED LUNGS—BUILT UP BONES
IN OUR BODY—ALL ABOUT THE BIRD FAMILY AND ANOTHER.

“A little one shall become a thousand, and a small one a strong nation.”—*Isaiah.*

WE are arriving at the termination of that exceedingly wet condition of things characteristic of the preceding period. There is an immense increase of mud-fish as mud increases, and after a time it happens that the smaller and weaker ones of these are crowded fairly out and driven ashore, when they must either walk and breath without water, or perish.

The lack of lungs is the least of the creatures' troubles ; after a good many gasps and a good many generations of unsuccessful trying, the airy swim bladder, which is no longer needed for buoyancy, becomes properly fitted up into bronchial cells, and makes an excellent impromptu lung ; but other necessities of life are not so easily procured.

We may fancy one of these little animals lying helpless on his belly on the muddy shore, gasping and hungry, four soft flimmer-like strings hanging uselessly by his sides ; he will try to employ them no doubt, but they bend double like bows of ribbon at each attempt, and will never serve to raise the body off the ground ; and, in fact, it is well they are no stronger, for if they had been stiff they would by such exertions have punched the soft body through, and thus spitted their owner and terminated his life.

Good legs and a good stiff body to carry them would be desirable no doubt, but how is he going to get them?

Will nature, looking down with pitying eye upon his wretched state, touch him with a fairy's wand, and presto, like the Harlequin in the pantomime, he stands forth a splendid quadruped and receives command to hold dominion over earth?

No, nature has no fairy wand; that dramatic invention is purely artificial in its origin. Nature helps only those who help themselves,—makes those who make themselves. Self-reliance or ruin is the alternative that all must learn sooner or later.

Well, *per contra*, is he endowed from the first with an instinctive yearning for something higher, intuitions of something better, aspirations after a nobler life which shall impel him to struggle upward, and so the desired legs gradually grow, as do the ballet-dancers by cultivation, with a desire for improvement?

Not a bit of it; far from this, his yearnings and intuitions are the very opposite. His natural aspirations are not up, but down; all he sighs for is the happy *past*; all he wants is his old lowly lot—and instead of trying to walk, he tries persistently *to get back* into the water again and to swim, and the consequence is easy to foresee; the big mud-fish, with their huge flappers and long necks and dragon tongues, are ready waiting to seize him, and thus he perishes.

Millions after millions of his race are swallowed; there is no other fate for them but annihilation.

One tendency, however, cruel nature *has* given him; all the formative cells elaborated from the scanty nourishment which he can procure, instead of concentrating and going to build up his system and make it larger and stronger to cope with adverse fortune, take French leave and run off independently, and straightway grow up into beings as miserable as himself. There is prospect of food for the sea serpents some time to come.

Ages pass ; each returning spring a myriad brood is born, a little handful survive, millions perish. Ninety-nine in every hundred are eaten ; one per cent. are preserved only by accident ; the few of those who are crowded farthest out of water by their companions,—and yet again only a very few of these, the few who are by chance a little the stronger of lung and leg,—live through the year. It is not strange, then, that the type of the race by this rigid selection is gradually modified, just as a breed of sheep is improved by the selection of the farmer who takes only the strongest ones for breeding, just as the ancient Spartans produced their hardy race by putting all feeble children to death ; extend the law through millions of years, and there is scarcely a limit to the changes that may not be brought about.

Such is the admirable but incalculably expensive method of training a race, an organism, or an intellect. Practised by the Spartans, formulated by Zeno, and scientifically grounded by Charles Darwin, it is called Spartanism, Stoicism, or Darwinism.

Spartanism is unpopular in these luxuriant and epicurean days ; it must not be for an instant imagined that so steep and thorny a path to perfection is to be sought out by you and me. “You may grow tough, but you will die a toughening,” is the old woman’s warning. Hard work and coarse food does not make strong men, it makes customers for the undertaker. Gifted with iron sinews and a strong stomach must he be who survives such a *régime*—and yet thoughtless ones observe him, and say, “See what virtue and bread and water can do.” Say rather, See what nature can do in spite of asceticism and bread and water. This admired survivor is the select among ten thousand—all the mediocre and ordinary individuals have been *naturally murdered* by such treatment.

HOW WE MADE FIVE FINGERS.

It is a proper place here to inquire how the little fellow whose tale I am telling came by the exact number of five

fingers ; why all future groups of digits, all future members, should be limited to precisely that number—for pendactylism is the rule in all the Vertebrate Kingdom. I have intimated previously that these fingers grow by the same process as that by which the buds of a tree sprout out into branches. If this were the case, would it not be reasonable to suppose that the number at first was not limited, but indefinite, sometimes not five, but six, nine, or twelve, according to circumstances ? Is not this the ordinary plan in vegetation ? And then, if it could be proved that a foot having five digits were the best possible adapted for locomotion, could we not suppose that as the ages passed and the “struggle for life” became severe, only those who were accidently possessed of just this number could survive, and so the lucky number at last became the limit ?

I do not think this is the whole explanation. In the first place, I hardly believe it can be shown that five fingers or toes are a better number for the uses to which fingers and toes are put than would be four or six. Further, when we consider how exceedingly various these uses are, we find a strange contradiction—a contradiction in the fact that hands so diverse as those of bear, cat, bat, and ape, all have the old number, five. True, the pig seems to have but four, the ox but two, and the horse but one,—and the cause is clear ; if you continually beat and batter down the sprouting shrub you will not fail to make an ungainly stump of it,—but in the *embryonic stages*, all three of these stump-footed animals have the five digital sprouts.

This hand, or five-budded branch of the animal is a famous member in the strife of naturalists. They tell us that these fingers, so diversified yet so uniform, are proofs of descent, of a universal brotherhood. The segments of the back-bone, too, are such proofs, but their number varies *ad infinitum*. The same is true with regard to the legs of insects ; the spider has eight, the bee six, and the centipede a hundred ; why then this five-membered symmetry among the higher classes of animals ?

I shall venture two replies to this question.

I. THE FIRST ANSWER.

1. We have formed our hands, our extremities, we have *rough-hewn* these *ends* of ours, by beating them for ages against the breast of our mother earth; precisely as we may splinter up the end of a stick by long beating against a hard substance, —they have been literally shattered into fingers.

2. That *divinity which shapes our ends* has not failed us here; it has gathered up the fragments and moulded them into five living petals; it has bound up the wounded fingers and wrapped them with the soft and tender beauty which Raphael so loved to paint. This is the work of divinity, the *vis centripeta*, the conservative force, gravitation. I don't know why it left us five fingers instead of six; I don't know why the buttercup has just five and the diamond just four; I wish I did; I shall never rest until I steal this secret of the great geometer—gravitation.

The development of digits, like that of flower petals, is a process of reduction, and as with these, the process seems to linger upon the number five.

II. THE SECOND ANSWER.

We are mistaken in supposing that the members of the much-neglected plant, irregular as they may appear at a rough glance, are set together by chance. Are not flowers the very types of law and order? Has not the buttercup exactly five petals—*always* five—and as beautifully symmetrical in arrangement as the most exacting teleologist could desire? Now, would it surprise you to learn that the wildest and scraggiest of trees, its leaves, and even to its gnarled roots, has deep in its bosom this orderly numerical tendency? Doubtless you never compared the roots of a thousand oak shrubs together, as you have a thousand buttercup flowers, to see if order reigned amid chaos. I am certain that I never have had the arduous pleasure, yet my faith is great.

Well, scientifically, what is the form of the buttercup? It is that of a pyramid standing on its apex, each of the petals forming a side; it has grown thus by the laws of crystallisation. What is the hand? Place the wrists together and hold up the two hands in the form of a bouquet; *you have a flower of ten petals, a crystal of ten facets.* This is literal. Would you like the demonstration? Sceptic! will you believe nothing, not even science, without the proof? Well, you yourself shall try the crucial experiment. Seeing is believing, is it not? Get the softest and whitest pair of hands of your acquaintance to assume that position; if you do not say it is the most beautiful flower on earth, a crystal more precious than the Koh-i-noor—(and sometimes more costly)—you are not an enthusiast in science.* The hand is the half of a ten-sided pyramid. Like the flower, it is a crystal—a colloidal crystal of albuminised carbon. The snow-flake, the lily of the valley, and the exquisite human hand are all one. Thus uniform is Nature in her works.

Thus we seem to have some reason to suppose that this member which hereafter, as we ascend the zoological scale, plays so important a part, was, like the snow-flake, born full-fledged and perfect. The shocks of coming ages may change and modify, but cannot destroy, its symmetry.

Another important stage in progress must have taken place at this time—the formation of bone. The proximate explanation of its appearance, whenever it may occur, is seen in the deposit of the inorganic matters which, being composed of smaller atoms than the plasma, pass through it, to the outside making shell, to the inside making bone. As an ultimate view of the growing hardness of organisms, we have to remember that all things in the beginning are soft, in the end dense. As in the case of the nebulæ compared to the dead planet, the child to the old man, so the animals of the earlier ages were all as

* That is the proper way of clasping the hands. It is not the attitude of a slavish worshipper, but that of a child of nature, inquisitive and hungry.

soft as are the eels and worms of to-day, but in the future all creatures will turn to bone.

In these mature days of life there is a medium massiveness of bone, muscle, and nerve, which is well nigh perfect as regards adaptation to vital functions; in the distant future we may expect the time to come when the children who are born will be like old men; even now it is noted that in the south of Europe, that is among the older races, "there are no infants," but at the hour of birth the child is as firm and unplastic as though run in a mould. As there will come a time when the earth will be dead—waterless, and airless, and without genial warmth,—so there may come a time when plasma will be too condensed to live or give off new germs; it will be hard, lifeless, incapable of further development.

Perhaps it is not all poetry then to see in the appearance of an internal skeleton, at this epoch, not only an important step in life, but a step towards death.*

With bones in his body advancement is more rapid, and during the three million years that now pass, our animal grows quite lizard-like. In fact there is a fair prospect of these martyrs becoming a race of young crocodiles in spite of themselves. A minority of their number succeed in getting back into their old aqueous element again after all, when they breed *in time*, not lizards, but tadpoles, and these are gradually transformed into great frogs. Now-a-days the change to frog from tadpole occupies six months, but when such a transformation first became established, it must have taken thousands of years to effect it. Practice makes perfect.

Frogs were probably the first land animals of any size; and what an opening for enterprise! once freed from danger through aquatic enemies, they could devote all their time to

* Or rather toward repose. Death is only a re-beginning of life's fitful fever. The scientific wish of the despairing soul is not "I would that I were dead," but "I would that I were petrified."

industry. With an undeveloped Eldorado before them they were situated as were the first of Californian gold-seekers; they must have enjoyed an exceedingly rich harvest.

With plenty to eat and nothing to do, they became wealthy, that is, they became monsters. They grew and grew until they were as large as oxen. One of the exceedingly grave and green-eyed monsters—I regret that I cannot give you his portrait—a bull-frog of the veritable size of a bull, ought to present an imposing aspect. His remains have been found in the geologic strata.

But I must attend to the lizard, who was the next animal fairly on his feet and ready for new undertakings. The lizard differed from the frog and the newt, &c., chiefly by breathing entirely through lungs instead of gills, and thus dispensing with the use of water, except as a beverage; forced to magnificent temperance by long ages of death; driven to it by the great propelling power to which we are all more or less victims,—the force of circumstances. Thus a second nature is given and a new type is created. The fish became a reptile. There was no more longing for the good old times; a more glorious prospect in life the world has never seen. The untrod earth was a garden of thick fleshy plants; whole oceans of appetising insects and delicious worms awaited only the eating. And the new-comers grew and throve as never has any immigrant race before or since; and multiplication was immensely rapid.

Westward the star of empire took its way much faster than at present; and northward and southward, from their muddy cradles, in the lakes of what is now India, but what was then the shore of a great northern ocean—for the land was reversed—they pressed forward and on, and filled the swamps and rivers, and fields and woods. Finally, there came a check, and competition set in, and the larger began swallowing the smaller, as the great dry-goods monopolies swallow the competing concerns of smaller capacities. And there

were giants in those days, for the conditions were just right to produce them—plenty of food and no enemies ; precisely the conditions for changing a wild briar into a cabbage-rose, a pig into a hippopotamus, and a fine little lizard into a great dragon. No increase in activity, however, rather the contrary, but only rapid growth—six inches to a foot, to five, ten, twenty, fifty feet in length. What seems like witchcraft when transferred to paper was only a great slow natural change, such an one as that from a child to a man, only not half so great or surprising. We are surprised at nothing now-a-days.

Such unprecedented growth and prosperity brought some curious consequences ; food became suddenly scarce. If there is enough for the parents, one may naturally suppose that there would be enough for the children. *But food increases in an arithmetical ratio, population in a geometrical ratio* ; and when an animal could take in a small forest at a meal, or a young elephant at a mouthful, the question of rearing children was a momentous one ; and as the sharks in the seas, ages before, had waged wars of extermination, so now began the crushing foot of the hungry dragon to be felt, and all nature trembled ; once again the ceaseless struggle for life deepened, and out of that struggle there arose new powers, new species, new types.

Before venturing further, let me endeavour to describe to you what sort of life the epoch presented—for every age has its own peculiar physiognomy. Among the agriculturists, pines and palms only had grown,—a strange crude vegetation like overgrown moss ; and of animals, it must not be supposed that the *reptiles* which characterised the time were anything like the snakes and turtles and lizards of our day ; these were born long afterwards, in a manner which I will hereafter show. The only scion of the family now living, which possesses in any considerable degree the ancestral traits, is the crocodile, the very *beau ideal* of a horrid monster. In Reptilia's palmy days, however, he could have been only one of the least among the

giant crawling hordes, that from the great southern continent,—situated where now the Pacific South Sea lies—spread out over the whole land. From the ruins of this vast empire,—that is, the numerous skeletons which have been found both in Europe and America,—it is easy in imagination to reconstruct in fancy (like Macaulay, in his famous fourth chapter), a picture of the time. We may draw a picture of England in an early age.

Hovering over what is now the busy London, with their shadowy membranous wings, were the giant vampires, with heads that were indescribably hideous ; under them, peopling the waters, creatures like fish, only with an awful pair of alligatorial jaws, and a slow flapping gait ; others like whales, with serpents' necks,—a swan made of a whale and a boa-constrictor.

On the land, ranging through the crude pine forests of Derbyshire, were the huge dragons, the masterpieces of creation. There were two types of these, the Forest-eating Dragon and the Flesh-eating Dragon, and either of these the size of a train of cars. As for personal appearance, the Hippopotamus is a fair and graceful animal compared to the herbivore of a reptile. A lizard sixty feet long, a head composed only of jaws that opened prodigiously, so that you would think the whole animal was going to open, a tail that was not a caudal appendage, but an integral part of the creature's body, and differed from the head chiefly in remaining shut and having no eyes, and, above all, that squat sprawling position,—the peculiar characteristic of reptilian life.

Of the Great Dragon himself, however, the Carnivore, the master spirit of the age, I will not attempt to speak. Poets and artists, from the days of St John down to the days of Pollock, over and over, have vainly tried to draw his portrait. Perhaps they have overdrawn it. The Dragon has come to signify something more than mere ugliness in the human mind ; it has come to mean something very evil. The

Dragon is the type of ugliness and the Prince of evil,—and though these notions contain the essence of truth, it is a truth idealised and distorted. Both ugliness and sin, though appearing clear and positive realities when seen in an æsthetic light, are found scientifically to be but negative qualities. The old creature, the *dragon*, as compared with the modern creature, *man*, is not a handsome person, and his virtues are not many or striking. All that is bad about him, however, is that which belongs to all old things,—that is, to all early things ; all the crude formations with which every institution begins. Compare Stephenson's Locomotive to ours ; the first house erected in Massachusetts to the latest French roof in Boston. The evil of the Dragon consisted in his inability to walk upright ; his ugliness, in the fact that quiet, artistic old Father Time had not yet taken the corners off him, smoothed down the sharp opprobrious nose, clipped, trimmed, and softened again and again the disgraceful and useless tail, polished the stony eye, and crowned the head with bright intelligence.

I have elsewhere said that we love and cling to the old things ; shall I say that we love the Dragon ? I regret it, truly, but it is a fact.

Poetry is crammed with yearnings—for the stupid and vile old past.

“ Oh, for the garb that marked the boy,
The trousers made of corduroy,
Well inked with black and red ;
The crownless hat, ne'er deemed an ill—
It only let the sunshine still
Repose upon my head ! ”

“ No wonder that I sometimes sigh,
And dash a tear-drop from my eye,
To cast a look behind ! ”

No wonder, truly, but does not man, in his splendid up-town mansion, furnished with all the modern conveniences, often sigh for the old log-cabin, as the honoured judge, with a glass of prime “ Heidseick & Co.,” sighed for Maud's beggarly tin

cup of brook water? The dragon's teeth were sown in every one of our hearts. *It is an axiom* that man is by his first nature *bad*, that he rolls sin as a sweet morsel under the tongue. *Never were truer words. Facilis descensus*; it is easy to go backward. There is much of the unhappy old dragon's spirit left in us, and thus it is well that our moralists should draw his portrait in the darkest colours, as a warning. But see the glory in the truth that all is past, that the reign of the dragon is over by three million years; that the dark ages are far behind; that each day the world grows happier, better, and more beautiful—like a girl approaching womanhood, a rose breaking into bloom, a youth at the opening of manhood's brilliant career, with motto—FORWARD, not BACKWARD. What a time! What a time to sigh for the puerilities of grovelling infancy!

Let the young man, oppressed, as he often is, with a sense of his unworthiness, confounded, as he sometimes is, by the senseless and vicious thoughts and desires that issue from the inner man, he knows not how or why, let him not be discouraged; and imagining that he must be hopelessly depraved, seek ignoble refuge from the still small voice, by popular devices. These failings are but the vestiges of a chaotic infancy shortly distanced.

Shall I tell you, then, to take no heed, that nature has prepared it all, and as a mature man, you are destined to be good in spite of yourself?

That you are destined to grow better is certain; that comparative happiness, and only that, is before you throughout all eternity, is beyond a doubt. Suppose you learn this, and fill your mind with it—will it make you less heedful, less eager to strive upward? No, on the contrary, an incubus is removed from off your back; you see undreamt possibilities of excellence opening up; before, you would have been well satisfied to have become a respectable citizen, and have a christian burial. When you once feel that this comes of itself

your mark is higher ; you look about you, and you see the world is filled with *honest* fellows ; great brawny hod-carriers, dull farmers, mechanics who are like their own machines, as true as steel,—and there are honest cattle and honest hogs, and so it goes, and you are amazed to note with the newly-opened eyes how cheap and natural, and how daily growing cheap and natural, is the quality. Thank God for it ! you say. Yes, it is the bread of life—and the water of life—but *shall rich Englishmen and Americans live on a diet of bread and water ?*

Is it not a shame that we, who eat dinners that Emperors would be confounded at, who traverse whole continents by steam, and speak across the ocean, should in the greater moral world tolerate for an instant so poor a standard, and then—natural result—often fail even to come up to that ?

Not a good man, then, but a noble man. The world is filled with good men, moral brutes, whose unnumbered crimes are—the result of their lack of brains ; a noble and a beautiful, a refined and delicate life then,—and yet higher and the highest, a *true life*. A fearless seeking after truth is the greatest and noblest of all—the life of Luther and of Lessing ; nay, it is that of Socrates himself, the founder of ethics. There are *untold possibilities* within the human breast, if the proper motive-power were applied, and the initiative step should be—*never look backward*.

The ideal of the olden time, the days of the Knight and the Monk, was "*the Good Man*;" in the last century, the polished age of Court, it was the *Gentle Man*; but the Coming Man is he who speaks and lives the *truth*, as nature gives it. "The King of to-day is he who elaborates great truths, and teaches them to his fellows."

THE SURVIVING REMNANTS.

THE BIRDS' ANCESTRY,—A FAMILY OF ARTISTS, SOMEWHAT PARTICULAR IN THE CHOICE OF HUSBANDS. THE NEWTS INVENT A HAIRY COVERING; THEY BECOME TENDER-HEARTED AND STIFF-LEGGED.

The surviving remnants of the great leviathan race next demand our attention. The bones of animals have been found other than those I have mentioned; an animal with horny jaws and toes, and which must have progressed over the ground by jumping, or by hops upon the hind legs like the kangaroo, or as the bird hops over the ground. The forward paws were no longer used, but shrunk close to the breast, doubled up at the elbows, appearing much as the forward limbs of the roasted chicken appear. The horny jaws were attached to an immense length of neck.

The origin of claws is easily explained. Did you ever, when suffering from certain suspicious twinges about the foot, permit yourself to wonder where the corn came from? Perhaps it never occurred to you what corns really are; that those little toe-corns are twin-brothers of the ten toe-nails,—in short, that they are but nails out of place. Well, upon the lips, doubtless, they are still more out of place; yet with every tortoise and every bird there they are found.

Perfectly to understand the reason for the long neck and its sharp horny termination, we must refer to the three grand modes of eating of the higher animals. One, that of fishes, is to move the entire body to the food,—Mahomet to the mountain; another, that of the quadruped, consists in thrusting forward a part of the body only—the fore limbs, and then seizing the prey and conveying it to the mouth; while a third consists in protruding another part of the body—the head, and using the lips as a prehensile. The persistent jerking, darting forward of the head, for many generations, could not fail to gradually elongate the neck, while the equally

incessant striking of the lips against hard substances would destroy it, did not nature fly to the rescue and throw into it a horny deposit. If you watch the ordinary barn-door fowl in the act of picking up corn, you will see the severe usage to which the lips are put. This explanation does not account, it is true, for the peculiarly neat and symmetrical shape of nail, claw and bill ; and it might again be argued that the nails are principally upon the upper side of the foot, instead of the under, as are even the hoofs of cattle. According to the theory, they ought to be hardest and thickest on the bottom. A comparison with the hard lance-shaped leaves of certain trees, as the orange, &c., will, I think, throw some light upon both these points ; the upper or outer membrane of the leaf is much the toughest and hardest by nature ; if, then, there should, for any ordinary cause, be a tendency to increase, it would be chiefly of the upper side, where the tendency had already begun. Note, too, how exactly the shape of the point of such a leaf, even to its very veins, correspond to the beak or the claw of a quail or partridge. Mere dashing the lips against rocks would tend to raise a shapeless callous lump upon them, which would tend to increase to an enormous mass, and which survival of only those the least misshapen and cumbersome would never suffice to round off and sharpen and beautify. The bills of many birds also are not the best adapted to their uses ; they are too slender. It is only the divine internal formation force that could have finished a reptile's bill and claw ; neither adaptation or selection could have made them *diamond tipped*.

These organs, like all others, and like each individual thing on earth, have been formed by the joint operation of

THE FOUR LAWS.

I.

THE LAW OF CRYSTALLISATION.—Condensing bodies tend to assume geometrical forms. This law, the first and greatest,

is ill understood. I could give only a rough and inaccurate example. If you, being an observer, take a walk through nature, you will find yourself struck with the idea that everything is trying to shape itself into a certain form, say that of a double pyramid or diamond,—leaves, a rosebud, trees, mountains, precious stones, flowers, fishes, birds, all exhibit this disposition. A solution of alum-water, in this sense, is an epitome of the world.

II.

LAW OF ADAPTATION.—*All forms are modified by surrounding conditions.* If a tree grow against a wall, it will become flattened “We are the victims of surrounding circumstances.”

III.

LAW OF HEREDITY.—*When forms have become changed, all others growing out of, or in close proximity to these, imitate that change, and assume the new type.*

IV.

SURVIVAL OF THE FITTEST.—On account of the great variety of conditions, then, accrue a great number of different types. Hence, then, arises a struggle for predominance. *The more perfect absorb the others.*

WAR.

The battle rages fiercely. Being chased by dragons, the weaker ones take to the rocks, where, if they do not starve or perish with cold, we may yet hear from them. Others being caught in the midst of the forest, having neither a retreat by water or by land, gradually form the habit of leaping upward to avoid seizure.

Any one who has tried to catch in the hand a jumping frog, knows that it is a very excellent, though not an uncommon, way of escaping an enemy. It must have been a curious sight to behold one of those bright coloured lizard-like little animals, springing far up into the air, out of the clutches of a monster,

the large glittering scales thrown up loosely, and rattling in the breeze. We may well suppose that the hind feet would grow strong ; and in the spring, the animal would strike downwards with the useless fore-paws. One may easily suppose that, as time wore on, the scaly covering, to the growth of which, like that of hand and nails, there is scarcely a limit, largely increased ; and the paws, thus beginning to be armed with little scaly parachutes, would begin to be of aid, in maintaining a long aerial venture. The slightest advantage once thus gained, fewer perish, and rapid multiplication must ensue ; then competition, and as ever, a new enemy in the person of the larger members of the race.

The advent of growing scales upon the paws of the little flying dragon was a last chance, for the voracious horny-jawed jumpers, their ancestors, had already begun to make fearful inroads upon their numbers. Death to all who cannot fly ! Death to all, except the favoured few, whose growing scales have the tendency more and more to split and lighten, until at last they are called feathers rather than scales ; and their owner, though still with the long reptile tail, a bird !

A new world is opened up again ; the flying insects and the opening foliage invite,—free from enemies again. But do not expect a repetition of the idle gormandice and mammoth growth, of the old races which, ages before, had themselves been emigrants. There is here no chance for this. It is no light undertaking to support a great mass of flesh and bones in a rare medium like the air, and in struggles on the wing,—it is *smallness*, and quickness, and lightness that are at a premium.

And so this curious nondescript, half frog, half kangaroo, and all crocodile, became a creature of light !

What wonders Nature shows us ! the crawling worm becomes a butterfly, the creeping reptile grows a winged bird. *And down in the egg to-day every bird must repeat the reptile steps of his ancestors.*

The butterfly comes forth and climbs the grovelling stages in the broad day, but the nobler bird crowds down those early days farther into the background and hides them under the maternal cover of the egg. "The numerous and important changes of form during the development of a bird's egg are so profound that the entire course of the circulation of the blood is twice changed. The second circulation is one common to reptiles—animals inferior to the bird; and the primitive circulation is that of fishes—animals inferior to the reptiles. The thing which comes directly from the egg of the butterfly is not a butterfly but a caterpillar. It is as if there came from the egg of the hen, not a chicken, but a little reptile, which, after crawling about the woods several days, should enclose himself in an egg again to resume the course of its growth thus interrupted. The metamorphoses of the butterfly are not more important than those of the chicken. Perhaps those of the latter, in fact, are the greatest, the others are only more striking."—*La Philosophie Zoologique*.

Here is a case that has long puzzled humanity; a case in which science has shown ordinary observation and common sense to be almost as much at fault as in the doctrine of the flat motionless earth and rising sun. Contrary to all observation and common sense, the earth is but a little ball whirling in space; and yet with a burden of proof still more conclusive comes the great truth of the bird's descent. The correspondence of internal structure of birds and reptiles is so close that naturalists cannot recognise them as separate creatures, but are forced to use one name for both, the "Sauroids," the lizard-like. There is, further, the absolute identity of the development of the egg of the turtle and that of the hen; both begin as reptiles, but the embryo of the turtle stops, and that of the hen only continues to a higher stage; and lastly, the strange transition-forms that geology has brought to light—reptiles, lizards, with growing wings, and birds with lizard tails.

THE AERONAUTS.

Fairly established in a new element, a type was gradually formed, one which was in most perfect harmony with the new life—the type of the bird. Various habits in long periods have made modifications, but could not, never can, destroy that type. Those who had advanced farthest from their old location, progressed most, and evolved the eagle—the rapacious; the larger portion, finding a lodgment in the tall tree-tops, became precocious active little songsters, like the robin and canary; while a third division, ever looking downward to the bad old life, became the goose, turkey, and all those scratching and paddling creatures which we despise and ridicule. The goose is our aversion; the sprawling, waddling gait, the stony eye, that downward tendency toward mud and water, suggestive of a watery discipline somewhere in the race, the peculiar motion of the serpent neck, and the horrid hiss and oyster-like stupidity, show the low desires, indicate that the creature *tries* to be what the alligator *is*—a true descendant of the long-past crocodilian aristocracy.* The goose is a thorough conservative, and must reckon the family line far back of William the Conqueror. The organisation is strongly set, and hard to change—unlike the pigeon. It is hard to learn an old dog new tricks.

The brilliant colours, soft forms and grace, and the charming love-songs of the birds, win our admiration, but we never give them the credit of being the true artists that they are. So widely separated as they are from us both by ancestry and by habits of life, by birth and by education, we have never yet been able to comprehend the mind or the soul of a bird, and so we say “there is nothing there,” and call it blind

* Poets have observed this. Southey says of the swan, “This bird is beautiful only from its colour and habits, for it is clumsy in shape and of most foul physiognomy; there is such a snakishness in its eye and head, as well as neck.”

instinct. A closer scrutiny of the brain will help us better to appreciate them, and to appreciate the distinction, mentally, between them and ourselves. There are three chief portions to the brain : the cerebrum—the phrenologist's hobby, the inner or middle brain, and the after-brain or cerebellum. The last of these presides over the mechanical motions of the body ; the middle one is the organ of the senses—the sensation organ ; the cerebrum is the great storehouse of phosphoric images—that is, the organ of memory. Now, in the bird this last is deficient either in size or power, or both ; the bird has a bad, a confused memory, while on the other hand his sensibility is large and keen—probably superior to that of man. As regards an eye for colour, an ear for sound, and, it may be added, a heart for love, the bird is one of earth's wonders. See the power of the eagle's eye and the richness of the peacock's plumage, add, too, that the middle brain is ten times the size of that of man, and you will begin to appreciate the idiosyncrasy of the *bird*.

“Their perceptions embrace a large range, favoured by a very considerable development of the senses. Their nervous and arterial organisation, excited by a rapid respiration, is of the highest order, and hence they possess an extreme susceptibility to all outward impressions, an intuitive perception of atmospheric and terrestrial phenomena, and an irritable sensibility. They are creatures of the air, penetrated by the element in which they move. Their whole organisation is filled with air as a sponge with water. Their lungs, their bones, their cellular tissue, their feathers,—in a word, almost every individual part,—admit it into their interstices, aiding their flight and enabling them, by their great buoyancy, to soar above the clouds and to sport at will in the atmospherical ocean. Their architecture is more latitudinarian than that of insects, and they collect their materials from the face of nature with joyous activity. The quickness of their vision and the rapidity of their flight enable them to supply their young

with food and to escape their enemies with equal facility, and the very business and preservation of life only promotes the sprightliness and activity of their nature." Birds are the sensationists, the creatures of sensibility *par excellence*. A race of artists, painters, musicians, they have cultivated the study of colour ever with a view to please, just as fashionable women learn accomplishments with a view to please—and by continual marriage of the prettiest they have beaten woman in the contest. If all human beings who dressed in bad taste were forced by public opinion to remain old maids and old bachelors, there would in a few generations be a vast improvement in personal appearance. If the customs of society were such, that no man without a sweet singing voice could win a wife, we should have a race of singers. *None but the brave deserve the fair, says the mediæval maxim, and the principle extends over all nature. Who shall possess the fair? With the fishes, it is the most active; among insects, the strongest; with the birds, the gayest and the sweetest; with the brutes, it is the most courageous. In France, it is the wittiest; among the Germans, the wisest; with Americans, the richest.*

And thus, by slow graded steps, the race approaches its ideal.

THE COMING SPECIES.

Amid the splendour of the great Babylonian and Persian Empire the few inhabitants of Greece were overshadowed; yet the former fell, and Greece reared the noblest and most perfect race the world has seen. Pericles might, in turn, have glanced with contempt at the colony of Stoics on the neighbouring boot-shaped peninsula; yet the Parthenon became a ruin and Rome mistress of the world. And later, in the golden age of France, what thought the Grand Louis of the few odd, big-headed barbarians in the Prussian swamps—Prussia which was once sold for a half-million ducats? Yet Prussia bears the eagle, and France hides her diminished head. The survey of the course of history teaches us this law, that

from a perfect organisation a moving equilibrium cannot develop another more perfect but that this must fall, while the coming civilisation is to have its origin in some lonely unnoticed branch of Nature's family.

In this law we see the certain refutation of the doctrine that man is descended from "the monkey !"

In the great geological ages the course of history was the same. From the lowest portion of the sea weeds, whose mighty forests first ruled the vegetable world, came the Irish moss and the liverworts, whose descendants made the giant fern-trees of the coal period. Such a prodigious vegetation would seem made to stand for ever, yet the unnoticed club-moss which gradually grew into power, disputing every inch of the soil, conquers at last, and rearing its head, develops into pines, hemlocks, and arbor-vitæ which ruled the succeeding age,—for the ferns are but overgrown sea-grasses, the "ever-greens" but overgrown club-moss, having no leaves or flowers.

In the animal line, it was the softest and most helpless of worms which became the voracious shark; but it was the most despised and miserable of little fishes which became in the course of the next eleven millions of years the master dragon and the grand Reptilian Empire.

Thus, strictly speaking, it is incorrect to say that the fishes became reptiles and the reptiles beasts; it would be like saying that the Greeks became Italians and the Italians Germans, which is not the case, though these races have successively represented civilisation. On the other hand, it may appear at first glance incredible that from one small class of animals—the unhappy little lizard last described, for example, numbering only some hundreds, perhaps—could come descendants enough to people an entire planet. Here again we have the exact analogy in history.

Rome was settled by a few people—history says two,—in a few thousand years their descendants covered the civilised world.

In a few years, if they are not to-day, the Anglo-Saxon race will be masters of every quarter of the globe. Surely, says one, such a great and glorious people ought to have a proud origin; they are doubtless descended from gods; or, at least, from some vast, noble and high-minded people.

Let the curious Briton or Yankee study up his genealogy a little, beginning with Turner's "Anglo-Saxons;" he will find, first that his ancestors were (alas! that I have to write it) savages; worse than that, drunkards; worse, robbers,—and in number, scarcely thousands.

We are sprung from a handful of drunken pirates!

Here is quality and quantity.

There is much more difference between one of these men, and the capable and intelligent Englishman, than between a rat and an elephant. It need, therefore, be no surprise that naturalists have found unmistakable proof that this latter is descended from the humble rodent, and this, again, from the water newt.

The history of the newt we are next to trace. We are back once more at the beginning of the great Reptilian epoch. The unfortunate newts had to take their chances with the reptiles, and, being the smallest and puniest, a hard chance it was. While the latter grew and thrived on the warm banks of the Ganges, these were driven to the extreme south, the coldest quarters, and to the barren rocks at that. There was again danger of extermination; had the race not possessed some latent qualities capable of development, it would have been the case. But such qualities appeared. The first was the growth of hair.

Here, as in other cases, there are two ways of accounting for the appearance of a new addition to the organism, and it is suggested, on the one hand, that the refuse cells which the skin is constantly throwing off, accumulating in the pores, gradually form little protuberances, and these, by extension, hair.*

* The *epidermal exoskeleton* results from the conversion into horny matter

It would seem, however, that hair, or something analogous to it, grows here and there upon every living thing. Such a theory will not account for the growth of hair as seen on plants. It is again suggested that its appearance is due, not to "accident," but to some unknown law, the law by which rays are continually shooting out from centres—the law of crystallisation. However that may be, this *thick covering*, as we now see it on all the higher animals, can only be the result of continued selection. No two animals of a race have hair of exactly the same thickness. Let the race be subjected for generations to extreme cold, and the thinly clad will continually die—the hair of the race will gradually become thicker and thicker,—wool, in fact, which is nothing but thick fine hair. A more important quality remains to be noticed.

There is a growing tendency in the animal world for parents to do more for children; and we find this tendency increasing as we ascend from lower to higher orders. With the fishes, the generative cell is dropped almost at random, and the animal has no more concern for it; with birds, a stock of albumen is prepared, and surrounds the embryo, making the egg, and the young are also fed by the parent bird after they are hatched; while the higher animals carry the growing offspring for a long time in the body, nourish it with milk after birth and care for it until nearly full grown; and, in the human species, not only is all this done, but the young man gets a schooling in addition, and cash to set him up in business.

The explanation of this is very simple. As the population of the earth ever increases, and competition grows sharper, it

of the superficial cells of the epidermis. The horny plates thus formed are moulded upon, and follow, the configuration of *areae*, or processes of the dermis. When the latter are overlapping folds, the horny epidermic investment is called a scale. When the dermic process is papilliform and sunk in a pit of the dermis, the conical cup of modified epidermis which coats it is either a hair or a feather.—*Huxley's Anatomy of Vertebrated Animals.*

is those who have this assistance in their younger days that are enabled to succeed in the world, and to arrive at maturity. And these possess the inheriting tendency to do the same, or very likely a little more, for the new generation, than their parents had done for them. "If I can only give John a thousand dollars when he is twenty-one, I shall be satisfied," says the sire. "My father was only able to give me a hundred, and a freedom suit."

It was only by the acquiring of such habits as these that the sorely persecuted descendants of the newt, the rat-like animals, saved their race. The egg being retained by each succeeding generation longer and longer, the tendency to ventral secretion (seen upon the soft side of all animals) gradually develops mammæ, until, finally, in these perfected modifications we see the basis of a new type, and the most important and interesting feature in all history.

"Chez la plupart des animaux les mamelles sont situées à l'abdomen dans le voisinage des organes généaux Nous pouvons dire que c'est là leur situation primordiale Ils font donc antagonisme à la matrice; il y a entre elles et cet organe le même rapport qu'entre l'extérieur et l'intérieur antagonisme de polarité entre les deux côtés du système cutané."*

The uterine pole of the social organ (crystal) being accidentally formed by the irritation consequent on the lingering of the embryo in its outward passage, this rudimentary crystal straightway manifests along its axis of symmetry a tendency to force into being its necessary other half, the mammellary pole; the clamorous and pungent kisses of the hungry newborn then furnish the stimulus, a *vis viva*; and natural selection finally rounds up the structure and makes it what it now is, the most extraordinary thing save one in the universe. What a piece of work, this statuette fifty million years under the chisel!

* BURDACH.—*Traité de Physiologie*. Fourth edition, vol. iv. pp. 351, 352.

The new type is called the Mammal—the animal with breast or bosom, and spiritually we designate them as the affectionate animals—the tender-hearted. It is only with these that we find in its full power the tender emotion which, from its beginning, between mother and child, is extended gradually to the family, then to friends, then to countrymen, and, lastly, to the whole human race. Who can describe the unutterable tenderness with which the mother “carries her offspring for long weeks under her heart, and nourishes it for long months upon her bosom?”

In looking through the events of the Reptilian age, we must mentally reverse our geography. Land, during this time, was not, as now, in the northern, but mostly in the southern, hemisphere of the globe, and the seat of empire, with all its scenes of war and despotism, was upon the great southern continent, that immense tract which is now the South Pacific Ocean; here was the birth-place of the bird, and the place from whence outward, in a feathery stream, came the winged descendants over all the earth; here, too, by slow and tortuous steps, was forced into existence the new race, Mammalia.

As the extreme southern part of this continent gradually grew colder, the reptiles retreated, still ever keeping the little mammals behind them, subject to all the inclemency of the climate; and finally the continent slowly sunk under the ocean, as the North American continent now is slowly sinking, and at last Australia only was left; and it is upon this strange island, “where everything in nature seems reversed, where the north-wind blows warm, and the south-wind cold, and the pears grow wrong end first,” that so many of the rude forefathers of present animals have been found living in the same old primitive fashion as formerly. Being isolated upon an island, *hence with unchanged conditions, they have not progressed*, and in the crude old-fashioned opossum, and wombat, and kangaroo, we see what the veritable parents of all our present animals must have been.

THE EMIGRANTS.

All the reptiles were now in Asia and Africa, and shortly afterwards there was doubtless an emigration of the Australians following them to the mainland.

Let us follow the fortunes of this small tribe of Australian emigrants. The ocean is behind them, the enemy before; food is scanty; some have retained their vegetarian proclivities; others vainly hunt for the few insects and smaller prey that the reptiles leave. As time wears on, this grass-eating division grow and thrive, and become the serious competitors of the herbivorous reptiles; they are of better metal, warm blood and a more perfect organisation, and between them and the cold together, the great dragons begin to decrease. They are crowded off into the water again, and the rivers are filled, and they assume a crocodilian aspect. The other branch of the Dragon family, the carnivori, however, were not to perish so quickly, they continue for a long time to make a fine living off the new comers. Our emigrants are, in fact, a most weak and paltry race; they are not much bigger than cats; they have large tails and long noses; they are still inclined to take to the water after their old habits; they creep rather than walk, and their motions are slow. But they are receiving a severe discipline, and must improve. They cannot go to the water; to approach that enemy's stronghold were sure death, and to avoid their land-enemies, the great dragons, they are driven to the most desperate exertions; from creeping they are driven to walking, and then to running. A baby which creeps on its knees has a decided mechanical disadvantage over the dog who runs on his fingers and toes; and our mammal is driven from the former to the latter mode of locomotion. Fancy a young and tender animal, like the pig or lamb, chased by monsters who desire to swallow him. He would strain every nerve to run; he would pitch forward upon his toes, and

bear his weight on his fingers,—he would run on tiptoe. Out of a brood of ten, during the three years of growth, only two perhaps would manage to escape—two with the strongest toes, those who had been able to utilise these as an additional length to the locomotive lever—and let this thinning-off process continue a thousand years, a thousand generations, and out of the myriads born, perhaps only two in the end would come out of the conflict,—but these two would have become, in the eyes of the old grandmother, if she could see them, deformed beyond recognition; the beautiful, soft-fingered hand which we have seen develope its five digits, is gone, and in its place only a cleft horny stump; two or three little prongs only mark the place of the lost organs, and now the animal's leg is lengthened by the addition of the two remaining middle digits, thus entailing a growth of limb. Try to support your weight on the two middle fingers of your hands, you cannot do it, yet thus does every quadruped. Observe the little dog when he is “sitting up,” as we call it, he is really in the same position as we are when we stand. What you call his knee or elbow, half way up the leg, is really the heel. In the horse this metamorphosis is carried out the farthest; by long continued running, and by the continued death of all those ill adapted for running, and bringing down, as in the gallop, the weight of the body with great force upon the limbs, they are crowded and jammed and doubled up almost into the abdomen. What we there call leg is nothing more or less than the middle finger enlarged, and the nail become a hoof; the little brown spot on the inside, which you have often noticed, might be regarded as the last remnant of the thumb.

Thus our emigrants, to avoid being eaten, acquired the habit of running on their fingers, and bearing thus their weight, transformed the nails into hoofs, and the fingers became as large as legs. And these stilted creatures now begin

to gain in power, and are next destined to rule ; the reptiles, henceforth, are to be outcasts, branded like Cain, and hated of all beings.

The sudden entire breaking up and wholesale destruction of the reptile hordes, towards the close of this mediæval age, is not to be accounted for by their failure in the wars with the newly rising superior races, but to the great change in climate which here occurred. Old earth is constantly cooling, and the cold-blooded Gorgons were fitted only for a climate to which our tropics are temperate,—they die off, and rising in their place appear the small suckling animals which they had driven to the cold and sterile rocks of the extreme south, where the few survivors were only those whom nature had endowed with strong constitutions,—above all, a double, warm, vigorous beating heart, thus preparing them to stand any amount of cold.

There is a fearful retaliation in after ages. It is always so. Throughout all the days of history, the Germanic race has again and again been beaten, and hurled back against the bleak shores of the North Sea, into a land where one must have a tough constitution, or die,—where one must have a keen intellect, or starve—and thus, year after year, the stupid ones and the weak ones have died (or emigrated to America), and the survivors are men who have stomachs of iron and brains of lightning—who can live on cabbage-stalks and sausages, and on such diet produce the symphonies of Beethoven, the “Cosmos” of Humboldt, and the needle-gun, with which they now retaliate on those who, in this exceedingly indirect way, are the cause of all their power.

Adversity is not sweet ; its effects on you and me and every other individual are misery and death, for we are healthy just in proportion as we are happy and rich ; but when the blow comes, and we die, we may rest assured that those who survive are such as, by superior wisdom and strength, have avoided it.

Adversity is death to the *individual*; but if there be the germs of one good quality in the *race*, it is the slings and arrows of outrageous fortune, and only these, that can bring it to the surface. The most perfect example that history offers in this regard is the story of the development of the birds. It is to be the fundamental dogma in the New Stoical Ethics.

CHAPTER VIII.

THE AGE OF BRUTES.

FROM THE FALL OF THE REPTILIAN EMPIRE TO THE RISE OF THE
BIPEDS.—“IRREMEDIAL, UNPUNISHED RULE OF FORCE.”

MIGHT IS RIGHT !!!

To understand the slow modifications and changes of type which every species of creature is surely undergoing, to understand the causes which have made Englishmen Americans, the jackal a dog, and the bitter almond a peach, we need first to appreciate the working of a most common law.

What makes the blacksmith's arm prodigious when his calves are dwindled, while with the *danseuse* the case is reversed? What makes business men have compressed lips and Germans round-lensed eyes? What makes the hog fat and the hound lean? No mystery about these things; we know and see and feel every day of our lives that our systems are as soft and as modifiable as clay in the hands of the potter. No one doubts that such an extraordinary creation as Flora Temple was made by generations of running, or that the elephantine dray-horse of our large cities was made such by another course of training. There is no man living of us who will not carry to the grave and leave to his children the indelible marks upon his body indicative of the way in which he obtained his livelihood.

Now take the case of the blacksmith referred to and let the son follow the trade of his father, and so on for two hundred years. At the end of these six generations the

latest descendant would be a marked man in any community, he would be an eccentric type of humanity. Why do not such anomalous types occasionally appear? Because the son does not invariably follow in the footsteps of his father. Why not? Because he has an acute memory and profound reason. The difference between the lives of man and the brute, is that the latter follows exactly in the footsteps of his ancestors, the former strikes out a path of his own.* If you have the biography of one animal you have the history of the whole race. Of the family of a farmer or bricklayer, one of the boys will become a carpenter, two will be clergymen, and six dry-goods merchants,—each getting his bread by a different process. Their children will vary in the same manner, and so in the race there can be no great advancement in any one special direction.

Of a family of tigers, on the contrary, every one will grow up an out-and-out tiger by profession. What may we expect from a race leading persistently such a life? Take the timidest rabbit that ever hid, and let the force of circumstances gradually work him into such a course of training, and in time—we do not consider sufficiently what *time* will do, time, that element which, added to drops of water, suffices to wear away stone—set this meek and slender little creature to the occupation of slaying; after the lapse of ten million years do you expect to see the same small timid race? By no means. Another class of facts bearing on the question

* In this growing individuality there is the sure guarantee that the outer form of man will never change further, or be materially different from what it is. Man is no longer an animal,—he is a great spirit.

“Beasts possess instinct, man is endowed with sublime reason.” The insects, birds, &c., are governed in their decision by the inherited experiences of their ancestors; while the primates, having discovered the properties of phosphorus, are, by its use, enabled each to record in the cerebrum his own individual experiences, and to profit by his own blunders as well as by those of his parents.

A beast.—“John, what is the reason you vote the conservative ticket?” “Because my father did, that’s reason enough for me.”

and no less undeniable, are found in geology. What have we written in the great book, the great true book of nature? There are its stone pages filled with unmistakable pictures. These pictures show that at the close of the Reptilian Age all animals were comparatively alike—a small undeveloped creation of which the opossum may be taken as the type, the only difference among the species being in the formation of the feet: here a race with a tender rudimentary claw, there a creature with a hardened foot, and again one with a rudimentary hand, like the wombat—insect-eating, grass-eating and fruit-eating marsupials. Now turn over the leaves. Many of the stone pages, indeed, are dim and blurred—thousands were burned up when the limestone changed to marble—yet when we find a clear picture, the middle transition-forms are unmistakable. Two million years of broken strata and debris, and again in the clear stone we see the imprints, not of these creatures, no more of those lowly rude-formed types, but there are tigers—tigers, and the antelope, and great bears. Where did these animals come from?

Now, taking these facts for a starting-point, I should like to show you what sort of an argument our evolutionary friends over the water are enabled to make up. I will show you “where the cloven foot peeps out.” Nay, it no longer peeps, it stalks abroad—bestrides, tramples. Listen, then for a little, to the language of the monster, the modern sphinx—Progression.

Two millions of years! a long time compared with the life of the individual; when compared to the great cycle of life, a little space—yet what may not be there hidden? We talk of the wonders wrought by time, and we proudly compare our locomotive-engines to the old war-chariots of a paltry two thousand years ago: an acorn in a hundred years is a tree; our little playmate, whom we left in pinafores and pantalets, we shortly find in corset and in crinoline. See thus old nature doing this work every day, every hour, under our very

nose—it is the veritable essence of her action. Now, are we to suppose that nature has been dead or asleep during all this time, during all these two million years, until at last one day there was a mysterious supernatural event to help her out? What do we want of Arabian Nights miracles? What do we want of such cheap stage-claptrap as marvels? Why invoke the supernatural when we can just as well have things come round in the good uniform, natural way? Is not fact better than poetry? Here is an acorn, a hundred years and there is an oak; here is a cell, twenty years and it is a man; here is an embryo animal, two million years and there is the perfect beast. It is a reproach on the understanding of man to say that he cannot see it.

ROME WAS NOT BUILT IN A DAY.

To suppose that the king of beasts grew gradually from a small animal, a veritable germ, as everything else does, is not overrating nature one jot, it is the repetition on a larger scale of what we see every day of our lives in every plant and every animal; but the picture of five hundred pounds of oxygen and hydrogen and nitrogen suddenly jumping up out of the earth some fine morning, and crashing and condensing together, and presto there stands a lion, like a jumping-jack in a magic box, is the conception of an exceedingly immature imagination. Such prestidigitation, such a piece of unnatural wizardry, would please a mind of the dark ages—it will not do for practical enlightened men of the closing nineteenth century; the tendency of the day is more and more for facts, for the natural and not for the artificial, and if we have poetry at all it must be reasonable poetry. Let us have that of George Eliot and not Sinbad the Sailor. We want our romance founded on fact.

So say our teachers. When the officers of the great mental army lead off in this kind of a strain, what is the duty of privates?

A friend of mine goes on a visit to America, to Boston, and he sends me back some very witty sketches of the different species of Boston character; he describes the Boston clergyman and the Boston dry-goods merchant, the Boston man of letters, the Boston doctor, the Boston working man, the Boston bookseller and the Boston rum-seller, and I am surprised and delighted at all this lively variety which goes to make up the city. In my mind's eye I am enabled to roll back a couple of centuries, and in place of such diversity I see but a unique type—one man, so to speak, a plain old Puritan farmer with his axe and gun. Is it possible that a couple of centuries suffice to produce such transformation? Certainly, it is the regular course of nature.

Did you ever visit a dog-show? It is a curious spectacle. You will see as great a variety of animals as at the best ordered menagerie; you will see creatures of every shade of colour, of all sizes; you will see every sort of ear, eye, and tail, and body and limb that exist, and every sort of disposition that you ever heard of. It is an epitome of the world; yet every natural history says, "All the various dogs which have been brought under the subjection of man are members of one single species, *Canis familiaris*." Is it not strange that from one primitive form should result such totally different creatures as the Newfoundland, the greyhound, the bulldog, and the spaniel? Theologic zoologists, who write natural history bottom upward for fear that the poor student may possibly discover and learn the true order of nature, set up the skeleton of the gorilla by the side of that of *homo* to show the immense difference between them. *I should like to see alongside of these the skeletons of the greyhound and the bulldog.**

* There is more difference between man and the gorilla than between any two animals whatever; but the skeleton is the *worst possible* device for showing it. It sets the young man thinking: if he has the ghost of the *Einbildungs*-faculty in his brain, he will draw the very opposite conclusion from what you intend. When I first began to compare those two

To breed from a single species this diversified and beautiful menagerie the *dog-show*, has required about four thousand years, a much longer time than to evolve the Boston display, but the metamorphoses are greater. The mind grows elated ; give us ten hundred thousand years, and see what kind of a show we can make. From *Canis familiaris* we have made bulldog, greyhound, spaniel, and Newfoundland ; from *Monotremata* we will make horse, buffalo, lion, bear.

What kind of a worker is Dame Nature ? Is she lazy ? has she lain idle for the last ten million years ? No, she is ever at work, never hasting, but *never resting*. Well, has she laboured might and main all this time without accomplishing anything ? Is she a sort of idiot who sits, as you may see them in the asylum, drawing a string back and forth through the fingers ? No, we cannot believe either of these ; there is no earthly delight like the contemplation of the wonders which the sure and slow moving hand of time has wrought.

THE IMAGE THE LION IS MADE IN.

Two sorts of beauty in the world—the beauty of form and the beauty of motion. The first is seen in the statue, in the order and regularity of architecture ; the other is what makes the great painting or the great musical composition. Turning from art to nature, we have the most perfect forms, this regularity and order, in the flower and crystal ; but we shall find that what we admire in the animal world is not this harmony of form—we shall find that the animal that we call beautiful is the one capable of some great *action*. We scarce think of the outward form of the mighty lion who stands before us, but it is the idea of the immense power that

skeletons, I was confounded at the awful *similarity* between them ; and if I had not immediately rushed to the other extreme of the organism and taken refuge in psychology, I should have become “no better than a Darwinian.”

he conveys by which we are fascinated. From an architectural point of view the lion is a deformity ; he consists substantially of a crusher jaw and two ponderous misshapen fore arms. The effect is grotesque (notice particularly young lions) ; but when you see this nightmare coming, you admirably applaud and clear the way—it is a complex vital bombshell, a solidified thunderbolt. There is nothing more grotesque than the skeleton of the horse—a monstrous paunch upon compound levers. Why, then, are these the most beautiful of animals ? We shall find the secret in the perfection of their functions. To pounce and to tear is the admirable specialty of the former, and he does it well ; to metamorphose large quantities of the coarse herb into locomotive power is the function of the horse. The fierce monarch, the swift racer, are the terms that we apply to them, and in these qualities lies all the charm. Motionless crystals and plants are regular—motion destroys symmetry of form. Wherever we find ruggedness, great action is the cause. We never see perfect form accompanied by great special action. The lower animals which are shaped almost like balls roll slowly and almost equally well in all directions ; the only internal force—call it creative, divine, crystalline, or what you will—is that which would tend to make every animal a symmetrical round ball growing by radiations outward from the centre : it is the outward forces of the rude world which change and concentrate, and give some strange new bent to this force, and the form slowly changes in accordance with the new direction. As growth goes on and motion increases, and in some one or two directions, it drags the soft protoplasm along with it, and out of shape, the regular geometrical figure loses little by little its regularity ; here will be a long protuberance forward, the rays have been drawn off in that direction by some external force, and it necessarily follows that the opposite end dwindles in consequence. You cannot call off all of the men at work on one end of the road to swell the ranks of the other, and

then expect both ends to go on building ; to be specific, an animal cannot have much of a head and much of an anti-head too. We are thus led to the conclusion that the curious and almost grotesque shape of the lion and the horse are caused by the grand actions which they display. Such motions working in a soft "fixed-fluid" material would make such forms.

In the struggle for life to which all are subject, some dormant quality is seized upon by the forces, and little by little exaggerated until it monopolises the entire nature. "One stern tyrannic thought that makes all other thoughts its slaves." And the soft plasmic encasement of this quality or function is moulded and bent to its likeness, until finally, even in the dead skeleton, we see the soul as plainly as in the dead photograph we recognise human lineaments.

If we know the cause of these actions, then we know the cause of all the curious animal forms.

Well, what makes the lion fierce, the horse swift? I have already said it is the continued running, continual fierceness, —practice makes perfect.

THE STOICS' REVEL.

I have now only to add in one word the name of that great master of inspiration which is at the bottom of the whole of it—*Hunger*. The law of slow starvation is all that is here needed to make the chain of cause and effect complete. The same thing has sharpened the lion's claws that has sharpened the Londoner's wits—competition, "survival of the fittest."

"So, young man," writes a modern French philosopher, "with your soft smiling face, and a rosebud in your button-hole, you fancy that you are to take your place in life as an invited guest takes his place at a sumptuous banquet? No, no, young man; *the places are taken*, and for your ghost of a chance

there are two hundred waiting, and two hundred who must have it or starve."

Which will have that place? The sharpest fellow. Why is a Jew the shrewdest of living men? What has made the qualities of Rothschild? The awful struggle for life, which the dying Hebrew race for eighteen hundred years have traced in blood. Rothschild is the lion among men. The lion is the Rothschild of beasts. They are the select among ten thousand myriads. By careful selection the farmer improves his stock; sometimes he errs, the skeleton man with the dart never errs.*

All mediocre and common people die soon after birth. Only the very select few—not one in a hundred—arrive at maturity. You think this a paradox. Here are the statistics:—

"The average of human life is about thirty-three years. One quarter die previous to the age of seven years. *One-half before reaching seventeen*, and those who pass this age enjoy a felicity refused to one-half of the human species. To every one hundred persons only six reach the age of sixty-five, and not more than one in five hundred lives to be eighty years of age.

"There are thirteen hundred million inhabitants on the earth, and of these thirty-three million die every year, ninety-one thousand every day, three thousand seven hundred and twenty every hour, and sixty every minute, and one every second."

There is such a thing as the "*struggle for life*." The earth is a great continuous battle-field, where each hour and moment we are madly trampling, torturing, and killing each other, possessed, as we are, by the wolfish and insatiable demon hunger that is within us. The gold room on a black Friday is the true sample of mundane existence.

To put it philosophically, the world is a sort of infernal machine, of which hunger is the mainspring. That there is in the organism any other power whatever for progress is expressly denied by the science of the day. There is no in-

* The three greatest men that have ever lived—that is, the most select of the human race—are, Rothschild, Meyerbeer, and Spinoza.

herent tendency in the human mind, or in any other mind, toward perfection ; there is no supernatural innate aspiration after the infinite, no yearning, upward-striving desire instilled into the soul from the first by which it ever seeks to soar toward the high and the noble. On the contrary, the tendency, from the very law of inertia, is for us to persist as we are, hence to degenerate, for when there is no progress there must be degeneration ; *facilis est descensus* is as true now as ever it was. Nature aids us not by reaching us a kindly hand in the shape of a noble aspiration, but by *blows* ; if the rod is spared, the child is spoiled. It is only by pricking, beating, and goading us, upsetting our fondest situation, ceaselessly reversing the conditions, torturing us on an eternal rack, kicking us from every possible standpoint to bitter death, and murdering ninety-nine out of every hundred of us in the fearful struggle, that the race goes onward and upward. The picture, not fascinating in the concrete, is beautifully and philosophically expressed in the formula "survival of the fittest."

"This world is a beautiful mechanism of wheels within wheels!" Yes, the wheels are *toothed* ; they never slip. The function of this mechanism is *assassination*, and the motive-power *starvation*. These two words lie very near to the *exposé* of the secret of existence, cause, or deity.

I see women in the London streets, with children clinging to them, who nightly sell themselves to preserve the lingering breath of life. These "dangerous classes" are good examples of its work.

I see the biologist with his murderous scalpel digging for hours in the live quivering flesh of the innocent little beast whose nervous system he wishes to study. The biologist is a good example.

I see the pale student dying over the midnight lamp (and the works of Hegel). That starving soul is a good example.

I see the works of the logician, whose fanged words tear

out the hearts of our fondest pictures and most cherished illusions, leaving the soul bleeding.* The logician is a good example.

All these are inspired by this demon or deity, and men can never be either great or dangerous without such inspiration.

If the struggle for life were to cease, the race would become extinct; we cannot will to advance, and the thing be done. Such over-legislation has been too often tried, and has failed. There must be a stronger power than the mere wishing; there must be a *vis viva* in the shape of a grand combination of force, resulting from favourable conditions, to make us advance. We are from the first, in one sense, but the victims of surrounding circumstances. "Nothing like necessity to insure success," is the saying; say, nothing *but* necessity to insure it. Good resolutions always fail.

PEDIGREE OF HORSE, WHALE, AND BUFFALO. THE SERPENT.

At the beginning of the Mammalian Age, some two million years ago, the continent of Africa was well populated with an insignificant kind of hoofed, grass-eating animal, something like a young sheep. All the races were nearly alike, as were the three European races at the beginning of the modern historical period, the time of Charlemagne.

This likeness could not long continue; different locations and different habits caused divergence of character, which as population increased was carried further by the growing competition.

The struggle began. All possible spots of the earth, from the tops of the highest mountains down to the bottom of the valleys, and even into the depths of the sea, were intruded upon, and all sorts of expedients tried to gain a livelihood.

As the years wore on, the diverging lines grew deeper. It was only the extremest radicals, those who were greatest in

* See Mill's "Logic," the book on fallacies. Read it if you wish to be crucified.

their own particular line, who survived. Those on the rocks increased in agility and endurance, those on the plains in size ; and thus in a short time the parent of the future goat and of the future horse might have been distinguished no less than the ancestor of the great whale.

Europe at the beginning of the dark ages was peopled with a homogeneous race of Gothic barbarians. Some of these settled in the east, some in the north, and a few upon an island. Twelve hundred years pass, and out of this rude savage race have developed the witty Parisian, the German professor, the acute English banker. The change is stupendous.

At the beginning of an earlier age we see a homogeneous race of young marsupials. A very long time passes, and from this undeveloped race have grown, by different lives in different localities, the swift horse of the plains, the strong mountain buffalo, and the gigantic whale of the sea. This change is not so great as the other, though more striking to vulgar eyes, who look only at mere mass and brute force.

From a wild life in the woods, too, the race of deer resulted.

Another class took to the marshes, where they invented still another way of living. There were plenty of roots buried in the soft mud ; the most aggressive of the reptiles had been killed ; the new comers had nothing to do but to root and to lie in the mud, with the warm sunshine upon them : and this mode of life entailed loss of hair, and only a few straggling bristles remained ; the legs dwindled, and remaining short, were no longer fit for running ; the body grew flaccid and fat ; the intelligence null, for there was no fear of enemies : the animal became a hog.

O most interesting of brutes ! thou creature who, of all others, hast had in the race for life the easiest time of it, thou art a wholesome subject of contemplation for the Epicureans, who would tell us that pleasure is the *summum bonum* of life, that ease and comfort is of all things the most desirable. Let

thy unwieldy sides, and wretched abortion of a brain be a warning to those who shirk discipline and abandon themselves to an idle life. Remember that an immense capacity for performing drudgery is the foundation of genius.

The other class of animals, the flesh-eaters, who had gradually moved in an eastwardly direction up into Asia, made great havoc with the remaining reptile tribes of this country. Few were left to tell the tale—the few whose outward scales were heavy and soldered together; and as again and again the softest of these were picked out by the enemy, the survivors of the race at last were encased in a perfect coat of armour—they took the name of tortoises. A few others also of a different nature were spared—those who were so extremely dirty as to be unpalatable; and yet even these were thinned out until the filth of their bodies became a veritable and deadly poison. They were the slender ones too, and those able to creep into the thicket and into holes, and to seek a hiding-place amid the gnarled roots of trees. And as time wore on and enemies increased, it was only those few of each generation who were a little more nauseous and poisonous than the rest, and a little more agile and slender, that were spared and perpetuated the stock; and the limbs finally growing useless, atrophied, and being for this skulking and ignoble mode of life rather a nuisance than otherwise, they were gradually lost entirely.

That the snake once had feet is proved by the embryo, which has them, and the rudiments of which are retained, in fact, to the end of life. And at last these skulkers, though for a time at the very verge of extermination, began to flourish; and they became experts, and began to retaliate in the most unexpected fashion by winding the long slim body round the adversary and strangling him to death. The snake's condition in life finally became a diabolically envious one. He avoids his enemies by becoming so vile and poisonous that nothing will touch him; his mode of life is so utterly detestable and

degraded that no creature will ever compete with him ; he is as free from invasion as the Esquimaux ; he is strictly let alone, and his race is destined to be a long one. From the day of his birth to the era of man the snake has had a constant and rapid increase.

A CAREER OF CRIME.

Our habits of life change us ; and the habits by which we gain our life, that *second nature*, is further fastened upon us by the constant success and survival of those who push the habit to its furthest extent.

A burglar becomes a changed man by his trade ; the race of burglars constantly becomes more cunning and more desperate as the dull-headed and bungling ones are gradually thinned off by the police. In the city of London there has grown up a race of men which are a class by themselves, almost another species of animal from the human.

This in the spiritual world we witness, and in the animal world it is not otherwise. There is a deeper meaning attached to this reptile, the snake, than the brief history I have given of him implies. The appearance of such a type in these comparatively modern times (five million years before the rise of man, ninety-five millions after the beginning of life) is significant. It marks a new spiritual division in society. In the antique age, fifty million years earlier, there were the social types clearly marked—the hermits, the precocious, the progressives ; and in the tortoise and the bird and the “beast” of the new age we see the modern indications of the same dispositions. But now for the first time only, in a late age of the world’s history, when competition had increased, and enemies were increased to that fearful extent that drives life to the verge of desperation and despair, appear that new organisation *the criminals*. This organisation, when it appears among men, is called the organisation of “the dangerous classes.” In our grandfathers’ days there were no criminals. Every

man was a murderer in those days, and so crime was no misdemeanour.

There can scarcely be said to be a race of criminals in America, though crimes are common ; but in the older cities of Europe, where the iron hand of hunger has so long and fearfully oppressed the despairing multitudes, there has grown up this new class of serpent-like people, who skulk and murder and rob in the dark as a means of gaining their bread.

These are the dangerous classes. If you should once catch the glare of their wolf's eyes as I have seen it in St Giles, you would never forget it. Now these human fiends are only imitators in an imperfect way of the snake, and the same cause, advancing competition, has produced both.

I wish to be understood literally and precisely when I say that the serpent is not, like the other animals, blamelessly following out his natural instincts. The lion, for instance, is no more to blame for his slaughter than is the butcher of whom we purchase our food. The lion is an innocent, but the serpent is a criminal of the deepest dye, and in this business a thorough expert.

What would you say to an assassin who softly enters one of our up-town palaces while the family are at dinner ; who, slowly entering the room when the family are seated, throws out before him a vapour more subtle than chloroform, the inhalation of which shall fascinate and hold spell-bound without rendering unconscious ; who dexterously proceeds with an iron clamp, under the eyes of the parents, to crush into a jelly the heads of each of the children ; and next, with the same smooth-running gesture, like the flow of water, so natural is it, strikes a light cross gash upon the faces of all the rest, and inserting at the same time a slow poison but the deadliest known ; then quietly possessing himself of all the wealth of the mansion, glides away to his den in a distant basement ? Would you call him a criminal ? I think you would. And the act, it is not too much to say, is a felony. Now, to me

the act is the same whether it be committed by that most aristocratic of animals, man, or by some of the lower ones; whether it take place in the Belgravia mansion, or in the heights of a wild-bird's tree in the forest. The serpent is the prince of criminals; *he is responsible for his acts*, and every day he pays the penalty, receiving loathing and contumely and the most ignoble of deaths at the hands of all the superior animals.

There should be another mode of execution invented for our capital punishments which would be more in harmony with nature than hanging or the guillotine. The culprit should receive the fate of the snake. He should be crushed to atoms by the fall of a heavy weight arranged for the purpose. "Crushed out of existence."*

THE RACE OF SATAN.

I am drawing some dreadful sketches for you to think of, and you are shocked, and you sigh and ask, "Why are people so bad?" "Why is there such a sea of wickedness in the world?" "Whence comes the awful depravity which we call crime?" Let us look now more carefully at the history of this prince of crime, the first criminal, and see if that will throw any light on the subject.

The snake is not a reptile, properly speaking. There is a vast difference between the two, which should be noted. When looking into the history of the great dragon, we found him harmless, found that his ugliness and badness were only of a negative character, and that the terms "crude" and "ill qualified" were the proper ones by which to designate him. The snake, on the contrary, is positively and in the true sense depraved and vicious. He is a descendant of the reptile, but

* I am not one of those opposed to capital punishment. Its object, however, is not to punish the offender, but to deter others from falling into his error. Society should so order matters that on the imagination of a person tempted to commit a capital crime should arise the most revolting and appalling image possible.

a distant one ; so is also the bird, and both have strayed equally far from the old lizard type. The proper name for a snake is not reptile, but serpent or satan, and his biography does not belong to the reptilian age.

The parallel history of the serpent and of the bird is a strange one ; it is the history of two races of feeble intellect crushed and driven to desperation and despair by more fortunate creatures.

The only difference between the two in the chain of cause is that the latter happened to be driven upward, and the former were pressed downward.

The weak-minded and weak-kneed little lizard stands at the opening chapter. Persecution and starvation, with a vast untried world opening up before, has made the bird ; persecution and starvation, with no means of escape, no relief by death, has made the satan.

It was an unlucky day for the little reptile when first the tree's roots or the stone's crevice offered him a friendly refuge from the pursuer. Sad, indeed, was it for him when he became thus habitually forced into the low byways of life. With the habit fairly upon him, he is pressed still closer and kept there ; and of all his race, those who do achieve any degree of success are those who sink deepest into degradation, and the starving grovelling race cannot do otherwise than retrograde. This skulking, cringing attitude slowly but surely incapacitates him for nobler action ; he is losing his powers—he is losing the use of his limbs.

If the creature were endowed with reason, he would make this discovery with the same feeling that the starving seamstress experiences when she discovers that overwork is slowly but surely making her blind. "O God !" the little animal would cry in his anguish, "I am losing my feet. Fate is surely taking from me the only possible chance which I have of rising from my degraded condition to that of other animals. I am losing the lungs with which I breathe, and my heart is benumbed and cold. These desperate straits to which I am

driven serve but to develop in a hideous trail behind all that is most ignoble in my nature ; and my children are starving, and no way but this to keep in them and me the breath of life. I would that I were dead !”

But here comes the most terrible part of it. We all of us, when sick and fainting, say with him, “I would that I were dead !” and we look to our dissolution as a happy termination of all our suffering ; but have we ever stopped fairly to consider that really such a thing as death is *impossible* ?

Here is a man suffering from a loathsome disease, and he says, “Never mind, my troubles will soon be over ;” but not so, there are two little children coming up, little *parts* of himself, and growing to be *wholly* himself, however mingled with other personalities. And in their diseased forms he still lives on, and in the children’s children on, and thus for ever, unless by the death of some generation without offspring, the disease is thus finally transformed into air and dissipated.

“I would that I were dead !” reiterated the miserable little creature from the depths of his loathsome hiding-place ; but the stream of life, by means of those generative cells, flowed ever on and on.

We often speak of *being killed* as the maximum of agony. Certainly being tortured to *death* seems the worst fate of which we can conceive ; but here we are introduced to a misery of which ten thousand million deaths by torture are but the wholesome and pleasant side of the picture. Such deaths are everywhere, but usually the resulting current of life, of the surviving “fittest” is growing better. Here it is continually growing worse ; here is a race driven to a horror and a misery far beyond death. It is like a man placed in a perpetual fire of which his own body furnishes the fuel, but which fire, instead of consuming him, tends to make him increase ; and thus, furnishing ever more fuel, the fire grows ever hotter.

The serpent race grew up a race of desperadoes such as the

world has never elsewhere seen. There is a continual *survival of the vilest*. Despair seizes them, and their breath becomes a hiss, and their tongues forked, and their eye evil, and their form an outrage and an anomaly in nature—their daily life the incarnation of dastardly malignity.

Alas for the serpent ! Alas, poor fellow ! Born into this overpopulated high-pressure world, there was no way left for him but this, and he could not die.

In closing his mournful story, we feel like asking, What has the serpent done to merit all this ? and there can be but one answer, *Nothing*, nothing in the world. He was as innocent as you or I ; society has made him what he is.

The history of the satan has taught us a new lesson. It is, *that punishment is not the reward of wickedness, but that wickedness is the effect of punishment*. That evil, wherever we see it in the world, is the result of long suffering ; that vice is in fact nothing more than suffering in a concentrated form.

Torture by long continuance becomes exaggerated or condensed, as an extract is condensed from the vapour of the still ; and this sort of spiritual essence of woe we call vice, and sometimes personify it in imagination, depicting it with horns, hoof, and tail, calling it devil—a pure fiction : but in the satan, or snake nature has solidified that essence, given it tangibility and moulded it into its proper shape.

“ For the criminal we shall feel only the deepest pity when once fairly we have seen and felt the harshness and bitterness of the strife of this world,” said an eminent American in a recent speech in New York. “ Men have been overcome by sudden temptations ; some are the victims of insidious habits, which have enslaved them before they are aware of danger. A counterfeiter may be a kind man, an affectionate father ; and a burglar can be generous and truthful. Convicted criminals are usually outspoken with regard to their history. I have rarely heard their recitals without seeing and feeling how easily all others might have fallen into their error. No

right-minded man was ever made complacent by listening to the story of his fallen brother."

THE FEROCIOUS.

I shall next consider that branch of Australian emigrants who had wandered farther eastward into Asia. These were the ones possessed of rudimentary claws, and inclined to a flesh diet. Their history has nothing of peculiar interest in it. There are certain successive steps in the career of all races, from that of men down to those of the fish; and the early part of the progress of the carnivora furnishes a fair ordinary example. First, there was

MULTIPLICATION.—Owing to that peculiar instability of organic matter by which undifferentiated cells are continually falling away from the mass, and each tending, by attraction of surrounding matters, to build up a new mass like the parent, multiplication is only limited by external hindrance. Every animal is striving to increase absolutely *ad infinitum*; and arriving in a new country, where new fields of forage are opened up, population may continue to increase for a little time without check, as it is now doing in the Western American States. These insect-eaters, beginning with a handful, became shortly a colony, and then a nation and a whole race. This general force of multiplication is one that through all history never loosens its hold for an instant, and thus the insatiable and eternal pangs of *hunger* which follow are literally the spokes of the driving-wheel of life. Hunger is literally the mainspring of progress.

The second step is

COMPETITION.—As the number of the emigrants increased, there came for each mouthful of food, first ten, then a hundred, then a thousand mouths.

EMIGRATION, or wandering, quickly followed. Goaded forward by the cravings of that terrible inner man, no peril was

great enough to deter them from venture. No spot was inaccessible to creatures dying from starvation.

Fourth, DIVERGENCE OF CHARACTER.—Those who had found a resting-place among the Himalayas became different in their character, habits, and forms from others who had by chance sought the plains; and yet, again, from those who remained in the old home.

Fifth, ENEMIES.—Emigration invariably causes war, for the invaded territory is already filled to overflowing with living things who will not give up without a struggle. For this new race to penetrate into the heart of Asia was to enter the jaws of death. The great reptiles and the reptiles' descendants inhabited the land, and slaughtered the intruders without mercy. With starvation behind them, and the open jaws of the ravening enemy in front, the increase of the race was checked.

ADAPTATION—CHANGE.—The severe exertions which such hard conditions imposed upon them could not fail to leave its imprint upon the constitution. Practice makes perfect, and habit becomes second nature, and the plastic body must follow such exertions when they have become so established as to be a second nature. There was a tendency in the race to an increase in length of leg, in sharpness of eye, and of facility in the use of tooth and claw, and of tough-enduring sinews; but this was not enough, there must be

SELECTION.—Many would be born who were below the standard in these points; some would possess the new traits in an extraordinary degree. Starvation quietly took the weak and puny ones, and the slow and duller became the prey of the monster.

IMPROVEMENT.—Ten thousand generations passed, and you would not have recognised the latest descendants. You may take the crude-formed opossum as the type of the parents, the trim wolf as that of the children. Long practice in the terrific art of slaughter had given them a permanent fierceness of

character. There had arisen a chronic excitement of the brain, which had evolved a race of madmen ; constant thinning out of the shorter and weaker had created a race of long-legged and iron-jawed furies. And now begins the work of

RETALIATION.—With this new constitution fairly fixed, the persecuted gradually became the persecutors ; there was no beast strong enough or swift enough to resist the attack of the wolf.

Having at last, through all these slow successive steps, achieved success, and assured his future, we might perhaps imagine that he may be permitted to enjoy it ; but such is far from being the case. Though the wolf is now undisputed possessor of the world, no sooner does he achieve his power than the great mainspring, which is never stayed, causes a repetition of the same round of change. The population checks starvation, and enemies no longer operating, there sets in once more

MULTIPLICATION.—And the same succession of steps might perhaps have been repeated, as again and again, over and over, they are repeated in history. But in this particular case peculiar conditions wrought out a very common variation of the programme—namely, *civil war*. The struggle with enemies ended, now came the more terrible one of competition. They filled the whole continent, and emigration was not easy. They have eaten their foes, and the tyrannic inner man is not appeased ; they must now eat each other. Millions born, food for ten. How to get food, the one great question that life has ever asked. “I starve!” “I starve!” And strangers first are eaten, then fall friends, then brothers and sisters must be sacrificed to the tyrant. And he is not appeased, and will not be until the stone ceases to fall to earth and its particles fly asunder ; for hunger is but the vital and spiritual side of the force of gravitation. At last emigration came ; from China, and from Russia, and from India down in a wild torrent upon the plains of Africa broke the wolfish stream—down where the stupid sheep were browsing, though seriously disturbed and preyed upon by

the carnivorous reptile. And the wolves fell upon these crawling creatures the reptiles and devoured them, and were consequently hailed as saviours by the honest ruminants, and claimed as friends. Alas! too soon the confiding brutes learned, to their death, the worldly lesson, that *in business there is no friendship*. "Death to the ruminants!" "Death to the eaters of herbs!" arose the war-cry—the cry whose echoes have not yet died away. A war of aggression was begun which never will cease, and upon each of the opposing sides all worldly gains are offered as contributions to the strife. And as the ages pass, the defences grow stronger and more impregnable, the weapons of attack are keener and more powerful. Gradually the creeping pursued are raised upon organs of locomotion, which carry them forward with the speed of the wind; and slowly, with the lapse of ages, they raise great bulwarks of horn and hair and hide, until in the buffalo we see a race invulnerable. Nor has the enemy been idle. Teeth have grown double rows of daggers, claws have become grappling-hooks of steel, and hatred and fury have concentrated so as to imbue their possessor with tenfold strength; and the lion's race is invincible. What a war! what a feud! Two million years ago the wolf attacked the lamb, and to-day their children the lion and the buffalo still continue the deadly strife.*

CAT v. DOG—THE SAVAGE.

Felis and *Canis* are two of the most prominent families of "the savage" in its deepest sense. The former includes the lion and tiger, and the latter the hyena and wolf. These last are probably the earliest race, being smallest and least developed, and employing the old-fashioned mode of attack—

* I do not wish to be understood as saying that the genera *Felis* and *Bos* are descended from the wolf and the sheep, but only from *some such* small animals—a small undeveloped grass-eating creature, and a small carnivora who ran down his prey. Such animals are found in geologic strata.

simply following or running down, instead of lying in wait and springing upon the prey unawares, an act which requires a considerable degree of intelligence. It is from the observation of these different modes of accomplishing the same object that the ideas of the dispositions of cat and dog have been formed. It is from this that we call the latter honest, and the former treacherous. I think the general opinion is in a certain sense a mistake. A skilful butcher does not arm himself with a knife, and thus armed, chase his victim for an hour round the enclosure, until the fatigued and terrified creature is finally cornered, and receives the fatal blow; but he quietly leads him all unsuspecting into the shambles, throws dust in his eyes or a cloth over his face, and then coolly knocks him on the head. We call the latter way of doing the business, as compared with the former, the result of intelligence and skill; and I am inclined to believe that this view of the case shows us the true issue of the question of the superiority or excellence of dog and cat. The fact is, the dog is a settled favourite, and *Felis* is a sadly-neglected and much-abused creature. While *canis* has been civilised and trained, the cat has never yet been fairly tamed. I am, in short, decidedly prejudiced in favour of *Felis*; and I expect to see her one day utilised and worked into the social scheme, and be made to do things for man which the dog never dreamed of, instead of being, as she now is, the unkempt Cinderella of the family.* If the lion is superior to the wolf, it follows that the cat is certainly superior to the dog.

I wish to say a word here as to the probable manner in which this habit of lying in wait, so universal with animals of the cat kind, was formed. First, it must be noted

* This is a mistake. *Felis* is too highly-developed a creature ever to become moulded anew into a good slave. This noble family represents, in fact, the *maturity*, while that of the wolf, &c., is as the *youth* of the carnivora—"the savage" race. Youth is plastic, hence our success with the dog. The former of these noble savages we paint on our banners, the latter is our scullion and football.

that all carnivorous animals live what is called a life of excitement. They have their moments of extreme delirium, followed by a period of depression and almost stupor. All this is very different from the calm even tenor of the life of a deer or horse. This tendency, as I have before shown, is the result of their profession. The death of a fellow-creature is always an exciting event, especially so to the perpetrator of the deed.

In the lion race this rhythm of excitement and depression is exhibited in its extreme form.

At some past period of history there must have been a time and place when prey was scarce and swift, and the pursuer was baffled, and could not overtake his victim, and was forced to go hungry. Wandering thus in a famishing condition, we may imagine that by chance he happens to *surprise* and overpower an animal. A good meal is the result; again and again the same accident occurs, each time a meal. Again and again he pursues in a direct way, and no meal, but continued hunger. Finally, there arises dimly in the creature's mind the connection between waiting and concentrating his energies, and a good dinner; and a rudimentary habit is acquired, which by long persistence becomes a second nature, and is further strengthened in the race as times grow hard by the survival only of those who possess the trait in the most marked degree; and so finally, as we see in the lion, it is the one quality of life.

THE LEMURIANS.

RISE OF THE FOUR-IN-HAND.

Between Asia and Africa, down at the bottom of the Indian Ocean, there lies sunken a country which in history has been the scene of the most important of events, the most momentous of struggles. This country is called Lemuria; it was for a long time the home of the fruit-eaters. Let us see how the law of selection worked there. The fruit of the tree is its seed; if that is eaten, the tree race dies. Thus, by con-

stant depredations of the fruit-eaters, all the softer fruits being devoured there remained only nuts—that is to say, the fruit of the land turned into nuts. But the animals were equal to the occasion, and they developed teeth for the purpose of cracking them. The fruit turning into nuts, and the fruit-eaters growing to be *gnawers*, was one of the slow changes of this age; and, finally, there was an emigration of these animals, of these newly-made squirrels, to America, which has ever since been the Rodents' favourite land. We will leave them there cracking their nuts for the present, and continue our study of Lemuria.

Toward the latter part of the Mammalian Age it was the scene of the greatest struggles probably that the earth has ever witnessed. It was an old country, and now densely populated. It had been the birthplace and point of departure for mostly all of the emigrant tribes. Like the old country, from which came our German and Irish citizens, like what London and Dublin and Hamburg are now, was the great Lemuria in the olden time—over-populated, teeming and bristling with life. Almost every animal in the world seems at this time to have had a temporary footing there, and all kinds and classes were engaged in a tumultuous struggle. A Lemurian forest of this age must have been a most wonderful and thrilling sight—an intricate web of fighting and struggling flesh.

It was here that the serpent took his rise, or rather his descent; and it was here, under these dire conditions, that were developed a widely different species of animal, not less interesting, which I am next to describe. Some of the flesh-eaters, accustomed by long and painful discipline—this death-and-starvation discipline—to climb into the trees, were at last forbidden descent by the great savage jaws beneath, that were ever open and waiting to catch the luckless wight who dared to venture; and so the species were fated evermore to be tree-dwellers, instead of inhabitants of mother earth. How they must have envied the flitting birds, who could come

and go and soar about at pleasure ! Their situation was the most precarious and perilous possible. There was little food—a few birds' eggs, a few worms which the birds failed to find. And there were big snakes above, and roaring lions and howling wolves below ; and they had no subtle art by which to gain a foothold—no wing like the bird, no poison like the snake, no shell like the tortoise, no speed like the antelope : it seemed as though nothing could save the Lemurs from destruction. And they crouched and cowered and trembled, and they brought forth a progeny of cowards. Fear developed caution. Having a mortal dread of a snake, one of these lemurs would be very careful when approaching a coveted apple, or a nest of young birds, to see that behind it was no boa-constrictor's head concealed. The foot of the lemur, too, by perpetual grasping, became a hand ; and the sense of touch, the feeling of rough and smooth, and round and flat, resulted also from this. And there grew up a mental distinction between this creature and all others.

The lion has little intelligence ; he knows light from darkness, and hunger from satiety. The phrenology of the lemur shortly showed, in addition to these, large fear, caution, and their reaction, spasmodic courage ; distinct ideas of light and heavy, and also of round and flat. These last *doubled his world*, as compared with that of the other animals ; and thus doubling his intellect, quadrupled his power for development. Being forced to climb trees where there are snakes, may not be, after all, so great a misfortune. Fear is the strongest of all emotions, and its necessary reaction, courage, is a great quality. The lemur learned to appreciate the difference between the two states, and this gave birth to a new emotion, that of *wonder* ; and this, when applied to outward things, is what we call *curiosity*. Fear also, acting and reacting with the emotions arising from hunger, builds up the quality of *egotism*. All qualities leave their impress on the organism. These acquisitions did not produce visible effects

like length of limb or growth of muscle, their impress was only in the nervous tissue. You could only have seen that the head grew larger ; it is because these continued impressions persist there, and leave images.

This sensitiveness of nerve-tissue is important. When a dog experiences a pain or a pleasure, it makes little impression, and the external actions connected with it no impression, upon him. In the brain of the monkey, on the contrary, both make strong impressions, and one may call up the other ; and when he sees a companion make those signs of distress or pleasure which have formerly accompanied his own pains or pleasures, he has called up in his brain a *revival* of those feelings—he suffers or rejoices also. This peculiar sensitiveness of nerve we call *sympathy*.

From this set of animals has issued in time the monkey race, a race more intelligent than any other except the human and that of the elephant. Their emigrations have been considerable, and there is no portion of the globe that has not at some time or other furnished them habitation. They have outwitted their enemies by the enormous growth of the very quality of *fear* which those enemies caused, added to the increased intelligence which the grasping capacity of the four peculiar hands created by developing the sense of touch. Slowly they have grown to be that grotesque, quarrelsome, and cowardly species which we now find them ; imitative, curious, and sympathetic as well. Their diet is omnivorous, their habits social ; and every act of their life is mixed up amid the external indications of all these qualities with such a noisiness and surprising agility, that they are a never-ending source of wonder and amusement for us. We are never tired of looking at the elephant and the monkey. It is because they are more like ourselves than are the other classes of creation. They exhibit so many traits which we feel instinctively to be our own, though but vaguely, like a caricature or rudiment. There is much to be learned from these animals ;

most clearly there we see as in a mirror those qualities which are lowest and most brutal in our nature, and it will help us to rise above them.

Both of these races have "had their day," and are now fast disappearing from the earth. "In all countries, as man is civilised and improved, the lower ranks of animals are depressed and degraded. Either reduced to servitude or treated as rebels, all their societies are dissolved, and all their united talents rendered ineffectual. Their feeble arts quickly disappear, and nothing remains but their solitary instincts or those foreign habitudes which they receive from human education" (Buffon). But I have not yet given you the history of the elephant. This monster is descended from those little gnawing animals which were driven from the "Old World" at the beginning of this age.

The western continent was to them again an El Dorado. When the pilgrim Rodents landed in America, they found warmth and plenty, and no enemies, and they multiplied and filled the land, and they slowly increased till they became elephants. Warmth and plenty caused their giant growth; competition among themselves wrought the curious and useful trunk, and gave them the prodigious powers of endurance.

We have seen so many surprising changes operating by the agency of great periods of time through the course of history, that this last one need not seem to us incredible. We look at the Newfoundland dog, and we know that four thousand years ago he was a small sharp-nosed wolf; we look at the peach, and we know that two thousand years ago it was a hard-shell almond; we look at the elephant, and we *may* know that nineteen hundred thousand years ago that monster was but a mere rat or squirrel.

We must be longer headed. The proofs are numerous; it is folly to deny them, say the zoologists. First there is the geological chain of intermediate steps; next there is in the trunk and tusk the lineaments that can be traced of the rodent

nose and those eternally growing teeth which the squirrel must constantly grind off; and in the foot and head, also, lie the sure marks of kinship. These last have shown, too, that the little hyrax or coney is the elephant's twin brother.

The coney is quite classic. Moses, the famous Hebrew priest of ancient days, took the little animal for a ruminant, mistaking the strange grinding off of the teeth for chewing the cud, and the odd elephantine feet for hoofs.

Finally, the embryo of rabbit, rat, squirrel, and elephant all pass through the same course of development—something impossible unless all had descended from a common ancestor.

We have now reached the most flourishing part of this age. The great Mammalian kingdom was at this time in its glory. Over the wide fields of Greenland and Europe and America, which were then united by a fine stretch of country, there waved a forest of palms and bananas, and rich tropical foliage in a tropical climate, and over all stalked the monarch beast in the glory of his reign.

Would you like a portrait of the emperor himself, a portrait of Mastodon Giganteus, Emperor of Greenland and North America in its palmy days?

“The most perfect, and at the same time the most wonderful of the land animals is the mastodon. Its dimensions were truly gigantic, sometimes measuring twelve feet in height by twenty-five in length. Its weight could scarcely have fallen below twenty tons. Like the elephant, it is characterised by two incisors, in the form of tusks, sometimes ten feet in length, and of a diameter equal to that of a man's body, and by very short ones in the lower jaws of the male.

“The most perfect mastodon remains thus far afforded were those of a head, ribs, and fore limbs of a very large male individual found at the phosphate works, on the North-eastern Railroad, while digging rock and fossil bones for the *Carolina Fertiliser*. The portions above mentioned were absolutely perfect when uncovered, and must originally have

settled to their resting-place while still more or less protected by their fleshy envelopes."

And here is one of his prime minister, *Elephas Primogeneus*:

"The mammoth surpassed the largest existing elephants of the tropics in size, for it was from sixteen to eighteen feet in height. The semi-circular curvature of the monstrous tusks with which it was armed, and which were from twelve to thirteen feet in length, serve to distinguish it from the existing Indian elephant.

"The mammoth was thickly covered with long shaggy hairs; and a copious mane floated upon its neck, and along its back."

And there were the courtiers, *Denotherium* and *Myolon*, and *Megatherium* and *Glyptodon*. And the bears ruled Belgium, and the hyenas ruled England, and the tigers Prussia.

But mighty changes are here as ever being wrought on the face of nature. Slowly the restless internal fires are heaving up in the midst of Europe that high mountain-chain the Alps. Slowly the other great worker, the *water*, is wearing off the western shores, carving that deep channel which now the Englishman must cross when he goes to Paris.

Thus continues the war of the elements; the fire raising land from the bosom of the deep, the water ever dragging down the proud land to its own level—Pluto and Neptune each undoing the other's work.

THE GLACIAL EPOCH.

And now appears a third gigantic force upon the scene, another king. There comes a chilling frost, a frost of a hundred thousand years' duration. A new age is upon the world, and the empire of the Mammoth will fall as did the Empire of the Dragon—as one day will the dominion of man; for even he, hard though it be to confess the truth, now

humbly bows, and must one day fall and die, before those pitiless despots, Jack Frost, and Pluto, and Neptune.

AN APOLOGY.

When we come to consider that all the words which have ever been written could not suffice to chronicle the world's changes during a single million years, and yet that within these few pages we march through a period of eleven times that duration, we might imagine the sketch would be hasty, *very* hasty and imperfect. The transitions, as here given, appear too sudden, the whole movement much too dramatic—too much like the old notions of “creative fiat.” I trust the reader will make due allowance, and not take the text too literally. Remember that the true conception throughout must be the *slow, natural, and steady growth of a tree*. The case of the lion forming a habit of lying in wait, for instance, as I have given it, is little more than a figure. The lion was not a lion at all when the habit was formed, but only a weasel, or something even less, a very embryo; the habit and the creature really grew up together. With regard to the idea that the lemurs being chased by lions took to the trees, the same thing may be said; the true philosophic way of putting it is, that a certain stream of carnivorous plasma gradually overflowing and threatening to absorb another smaller stream, this latter turned its course upward—thus flowing up or growing up the trunks into the network of branches overhead.

If the reader bear this in mind he will not be misled.

I have one word further. In speaking, as I have, of lion, horse, and wolf in connection with geological eras, it is much as though I should talk of the clergyman, the broker, or editor of antiquity—an anachronism: it was, in reality, much grosser-formed creatures, more like the hyena and the bear, that ran the carnivorous business of this early epoch; while the sivatherium, that strange mixture (not yet separated) of ox,

deer, hog, and horse, ruled the meadows. But I have been obliged to illustrate with such apparatus as is understood. For the rest, I would recommend Figuier's "World before the Deluge." If you have not time to read it, at least get it and look at the pictures.

GENEALOGY OF THE LILIPUTIAN FAMILY.

There is no real distinction that can be made between animals and plants. Even the ordinary and most obvious one—namely, that animals move and plants are stationary—fails on closer inspection to prove itself true. Young sea-weeds are provided with little flippers, and swim about as lively as fishes; animal corals are fast, and build themselves up into great trees, like cedars of Lebanon. The sponge, that ancestor of all life, is neither plant nor animal, for it possesses all the qualities of both. We look on plants as little worthy of our esteem, as a sort of dead matter; yet the worst that can possibly be said of them is, that they are the least intelligent of creatures, and we shall find that this comes from their mode of life.

In the beginning of history, one class of the hemispheric sponges by chance forced down little suckers into the earth, and thus drawing nutriment, built up a hard centre or axis; others had lumps of plasma falling upon their tops, and attracting these downwards, a hole instead of an axis was formed; and so finally one became a sensible *tube*, and the other a senseless *stick*. This is about the whole of the matter. One is a centrifugal, and the other a centripetal. We will only add, that by persisting in these habits one becomes mobile, and the other stationary, rooted—and the mystery is out. *Plants have stood still so long that they have lost the power of motion with its corresponding progress in sensibility.*

The plant, then, is a fellow-creature, although a stupid one; and when you pull a flower to pieces, you are taking a fellow-creature's life as much as when you crush an insect, or break

an egg, or pluck a sponge. The vegetative creature is struggling and fighting the battle like all others. Through the long ages he is striving after immortality as all the rest of us are, and he has soul the same as all else, for without soul there could be no life.

"Then you believe," exclaims the reader, "that man is just like brutes and vegetables, and when he dies that is the last of him! I have suspected you all along."

"Such, however, is not my belief."

"Well, then, you must think that plants and insects, like us, are immortal."

Reader, why are they not? Are you not just the least bit egotistical in claiming that glorious hope entirely for yourself? Is naught else worthy but you? Take the white lily, for instance, which is the very type of purity and innocence. Year after year, and age after age, this being has struggled to lift her poor white head higher into life, has fought against enemies, has fought against competitors, has wrestled with the rudeness of climate, striving to perpetuate the life of her race, praying for continued life, praying for more life, as all that breathe are praying for it; and yet, after all this, will you have the heart to don your new white robes, and upon your golden harp chant her death-knell? And there is the butterfly, the being that you select as the very emblem of your immortal soul. I shall tell you next *his* story, how by his own exertion he has raised himself, in the face of every difficulty, from the condition of the humble caterpillar to be the bright thing he is; how for untold millions of years he fought with every form of brute or reptile the broad earth could furnish, and yet each day grew brighter and better. Through the long Reptilian Age, that valley and shadow of death, he was preyed upon by the dragon, the lizard, and the serpent, and yet still to-day, in the valley of humiliation, he struggles with hawks, and dogs, and men. And now after all this, when at last the Delectable Mountains shall be reached

and the promised land in view, shall this being, who has fought a thousand times to your once the good fight, and has yet grown more beautiful, who has never sinned, while your own crimes are manifold, and whose hope, like yours and mine, is for the great reward of life eternal—shall he be rejected? Would it not be rather selfish in you *alone* to cross the Jordan, and, as you proudly drive your four-in-hand over the golden pavements, consign your bright and faithful fellow-creature after all this to ignoble oblivion?

For my own part I am no aristocrat. I have not the slightest objection to the companionship of the insects and the flowers in the realms of bliss; in fact, I don't think I could quite feel myself at home without them.

"But the Bible," remonstrates the reader.

That is the last book on earth to teach us selfishness or bigotry; "it is the colossal conceit of man that has misinterpreted the inspired word." We must give up these childish ideas; rest assured that both reason and inspiration tell us that eternal life is no more the destiny of man than also of those creatures of lowest intelligence, the trees, and those of highest intelligence, the insects.

You thought *man* was the highest?

He is, if you take his own word for it; if you were to ask the opinion of the eagle, or the ant, on the subject, they might disagree with him. Was there ever a Prussian who wasn't firmly convinced that the German race were superior to all others? was there ever a Franco-Celt less confident of the superiority of Frenchman? and as for you, do you not *know* contrary to both that the Englishman is the noblest of all? I do, and although I have "travelled"—I cannot get the notion out of me. To come directly to the point: science teaches us that although the nervous system of man is more massive, yet, as regards acuteness of intellect, it is the little *ant* that on this planet bears the palm. *The most marvellous speck of*

matter in the solar system is the brain of an ant. I have too long neglected in my history the insects,—that great kingdom so generally neglected and ill understood, yet, perhaps, the most important of all.

The Spectator, in its notice of M. Pouchet's work, "The Universe," says : "Man generally flatters himself that his anatomy is about the highest effort of divine skill ; yet that of the insect is far more complicated. No portion of our organism can compare with the proboscis of the common fly. Man can boast 370 muscles. Syonet, who spent his whole life in watching a single species of caterpillar, discovered in it 4000. The common fly has 8000 eyes, and certain butterflies 22,000. M. Pouchet treats it as an established fact that so fine are the sensory organs of ants, that they converse by means of their antennæ. Consequently, the strength and activity of insects far surpass ours in proportion. In the whole field of natural science there is nothing more astounding than the number of times a fly can flap his wings in a second. As the fly passes through space at the rate of six feet in a second, it must in that point of time vibrate its wings five or six hundred times. But in rapid flight we are required to believe that 3600 is a moderate estimate. The mind is stupefied if it attempts to realise these results."

Such a race of animals certainly deserve a place in history ; I now hasten to make good the oversight.

We must go back to the beginning of life where the first Silurian worms were lashed about by the waves and blown upon granite rock. Though thus dashed in pieces by the elements, and eaten by each other, they became the first inhabitants of the land.

They had a severer time of it than ever had the Pilgrim Fathers, and many of them hardened under the treatment and became Crustaceans ; a fatal step ; encased in such a shell, the world is a sealed book ; the history of the crab is

that of a youth, who, forming too firmly and too early in life his habits and opinions, becomes crusted, and closed for ever after against all liberal views. A crab, it is said, reads nature about as well as a blind man could read it by poking the objects with his walking-stick.

Others—little strings of heart-shaped segments, each segment provided on the under side with a pair of petal flimmers, and on the upper with a pair of leafy gills—are cast high out from the sea by wind and waves, by enemies and by other accidents. There is a quick and easy transformation of the swimmerets to feet, such feet as the insect possesses; there was no long struggle, as with the little lizard who had to build—almost to create—new limbs by which to support himself. The many slender petals which the lizard had utilised as frame-work ribs, were with the insects organs of locomotion. They furnished a superabundant supply; in fact, many of the posterior ones shrank and died away, and their segments integrated more closely with the forward ones, forming a solid body, and the forward ones underwent slow transformation. The two first being pushed out ahead in walking, by long habit became incapable of locomotion, but all sensitive, became feelers. The three succeeding pairs grasp and crush the particles of nourishment as they pass into the organism, and thus, after long *practice*, and coupled as ever with *survival* of the most expert, these became the six insectile jaws. And the leafy gills grew into wings, for they were no longer needed to breathe with—the air entered at all the pores of the body.

You have seen the ephcmera—a worm in the water, rising from its depths into the air,—and all these transformations take place with him as they have with all his ancestors. Practice, again I say, makes perfect. Thirty million years were occupied by these transformations when they first occurred, now they take place in a few hours. And this is the law: “*The career of the individual is a short recapitula-*

tion of the successive steps in the career of the race, that is, of the sum of all his ancestors."

Note here that certain races of this kingdom did not take to the wing, but, being hard pressed by the crabs, &c., began hiding and burrowing themselves in the earth, and submitting, as they constantly were, to the falling particles, they invented a coating, a slimy secretion with which they strewed their pathway, and they had no wings—these became spiders.

We have now in the insect history arrived at the beginning of the Reptilian Age, in the year of the cell—(A.C.)—80 million.

Let us at this early date draw a comparison between the two great animal kingdoms, and see which has the best prospect of future success in the race for life. There is of the one only the small lizard, an organisation having four flabby feet and two very weak eyes. He does not appear of great account. The other animal, the insect, is of the same size, has six strong legs, six jaws, four wings, a thousand eyes, and two feelers; he is armed and equipped. The lizard creeps distractedly and painfully; the insects already, by progressive differentiation, are flying and running with swiftness and precision—they already present the diversity of carnivora, herbivora, and liquid eaters—and miners, and spinners besides. The chances seem all in favour of these. Here is concentrated all the intelligence and activity. But roll on ten million years and again look. There stands that gigantic toad, the Laborinthodon, who opens his mouth and takes in forty whole nations of those precocious ones at a gulp. If we had been watching the course of *civilisation* only, and from an abstract or spiritual point of view, our entire attention from the first would have been absorbed by the progressive insect, and this unexpected apparition would startle us. The two subjects are as unlike as "Taine's Philosophy of Art" and a Prussian battery, the one of which is but a few little drops of ink upon white pages, the other a monster, the

crusher of a city. It is time we looked into this matter. Which is superior, the intelligent insect or this stupid but monster vertebrate? In the one we have acuteness, in the other brute force; in the one we have crude mass, in the other fine mechanism—a watch and a saw-mill.

WHICH WILL BE KING?

The very perfection of this little organism will not permit great development, and its sharply-cut atoms will not permit others to attach themselves so as to make a large growth; the race is fated to be a Liliputian one—they are precocious. The impossibility of increase in mass will make them the most fertile of beings, and this, while it will prevent extermination, will cause the struggle for life to be very severe. We may expect that the vertebrate will be monarch and rule by mere size, but that the delicate and refined qualities of soul and intellect will be found in the descendants of the insect. We may expect that in future ages, when the mastodon and the elephant shall stalk with a tread that will make earth shake, it will be the descendants of the Liliputians that will build cities and works of art, that will found societies, military and industrial, that will be the first of all the earth to invent a language and a system of education.

And this prophecy I have next to prove to the reader has been strictly fulfilled.

The only strength of the insect lies in his numbers—in his incredible powers of multiplication. During the age of the fishes, when insects were the only land inhabitants, their numbers rapidly increased, until, at the beginning of the next age, the earth was covered. For vegetation the rise of the reptile was opportune. When we see a species of beetle capable of destroying a forest in a single night, and the whole territories devastated by locusts, we may imagine the peril of the agriculturists, the plants, at this time. The slaughter of insects at this time by the rising reptile, defies description;

with the woman in "the Forty Thieves" it is impossible for us to count, we can only measure. One thing we may be sure of, all the weak and lazy ones, all the half-fliers and half-formed ones, never left offspring to tell the tale. The few that were left were the select among a good many millions of measures, the few among several thousand oceans full; and later, when the birds came, there was again a slaughter, and a selection from among the select were the only survivors; and again and again, not successively but steadily, this process is going on, and in the later times it was only a few lucky ones possessed of the germs of some special quality or organ, which could survive. Wings could not save them when the swift birds came, and the unlooked-for mode of locomotion of the grasshopper grew up. Wings would not save them, but peculiar colour might, and we have black beetles upon black earth, and brown beetles on brown logs, and green beetles upon green leaves; the few lucky ones whose colour, happening to be like their sitting place, saved them from the bird's sharp eye. Wings would not save them, and they formed mutual protective unions and developed stings. Wings would not save them; one race was luckier than all the rest—being hard pressed, it conceived the happy idea of alighting upon the back of its pursuer. This was the greatest invention yet, it was taking the bull by the horns; and now safely perched upon his back, he has nothing to do but to ride, cling fast on, and sharpen his jaws, and *bore*. The grasshoppers are slowly decreasing and will shortly be no more, the devices of the beetle will not long save him from the growing intelligence of the bird, but the mosquito and fly race *has struck oil*; their posterity is assured. Some of the children have counted too much on their good fortune, however; like some sons of rich fathers, reared in the lap of luxury they have made no exertions for themselves, and, consequently, have degenerated.

The wretched louse was once a young fly as festive and gay as ever was born. Idleness and too much good living has

ruined him. Let his fate be a warning and let us put a copy of his history into the hands of our children instead of Mother Goose. It will teach them the nobility of labour.

GETTING INTO SOCIETY.

Three things make up the life of a bee. Obtaining food, producing young, defending when attacked.

Bears like honey; a single sting will not kill a bear, a thousand may. The following was perhaps the bees' "social contract:" "We will sting together in mutual defence."

Stinging together necessitated always being together, and hence the two other functions went on in concert; each bee, however, gathered her own dozen cells of honey and reared her own children.

Now, in a vast colony of creatures like this, it happened, of course, that there was some considerable difference in native capacities; some were hard workers in the field, but had no taste for the care of children; others, on the contrary, were excellent fathers and mothers, but hated work; and so, gradually, there came about a *division of labour*. One portion of the community gathered the crops and the other stayed at home and managed the juvenile business.

The labouring classes were the more numerous, but the others, who became the aristocrats, increased in size and importance, and became supercilious, and drones to boot—for laziness is a natural quality of aristocrats. And then came a bloody revolution, and society started again on a new basis of liberty and equality, and the result was another revolution bloodier than the first, and all the drones were killed but a half-dozen whom they reserved as courtiers; and they elected a queen and established an absolute monarchy.

I am talking of these "insignificant insects" as though they possessed all the reason of men, am I not?

The anatomy of the insect is a strange one. They have "a brain in the abdomen, and the heart in the small of the back."

This makes their ways and customs strange and foreign to us. "Most foreigners, for all that I can see, are fools," says the uneducated man. We can *not understand* insects, and so we call their intelligence blind instinct, on the same principle, doubtless, that we pronounce a man devoid of sense, because he does not think as we do.

This once settled, we give little more thought to the matter ; the habits of insects are not even known by men of the world.

How many know that a certain ant plants and harvests yearly a crop of rice ? that other species have generals and priests that accompany their armies ? How many know that caterpillars not only form societies and Sorosis clubs, but go out together, these juvenile butterflies, on the march in lines more regular than do the pupils of a ladies' boarding-school ? Some ants keep and milk cows ; others keep slaves. All ants have a language more or less perfect. Truly one half of the world don't know how the other half lives.

I cannot close the sketch of the history of the Liliputians better than by asking you to take a voyage with me to this foreign and unknown world. Unfortunately I am not an Entomological Columbus myself. The following accounts are extracts partly from German sources, partly from Wood's "Homes without Hands."

A NEW AGRICULTURAL COMMUNITY.

There is a remarkable insect, a native of Texas, and until a few years ago its singular habits were unknown. Dr Lincecum, however, wrote a long and detailed account to Mr Darwin, who made an abstract of it, and read the paper before the Linnæan Society, April 18, 1861. This abstract may be found in the journal of that society, and is as follows :—

"The species which I have named agricultural, is a large brownish ant. It dwells in what may be termed paved cities, and like a thrifty, diligent, provident farmer, makes suitable and timely arrangements for the changing seasons. It is, in

short, endowed with skill, ingenuity, and untiring patience, sufficient to enable it to contend successfully with the varying exigencies which it may have to encounter in the life conflict.

“When it has selected a situation for its habitation, if on ordinary ground, it bores a hole around which it raises the surface three, and sometimes six, inches, forming a low circular mound, having a very gentle inclination from the centre to the outer border, which, on an average, is three or four feet from the entrance. But if the location is chosen on low, flat, wet land, liable to inundation, though the ground may be perfectly dry at the time the ant sets to work, it nevertheless elevates the mound in the form of a pretty sharp cone, to the height of fifteen or twenty inches or more, and makes the entrance near the summit. Around the mound, in either case, the ant clears the ground of all obstructions, and levels and smooths the surface to a distance of three or four feet from the gate of the city, giving the space the appearance of a handsome pavement, as it really is.

“Within this paved area not a blade of any green thing is allowed to grow, except a single species of grain-bearing grass. Having planted this crop in a circle, around, and two or three feet from the centre of the mound, the insect tends and cultivates it with constant care, cutting away all other grasses and weeds that may spring up among it, and all around, outside the farm circle, to the extent of one or two feet more. The cultivated grass grows luxuriantly, and produces a heavy crop of small white flinty seeds, which, under the microscope, very closely resemble ordinary rice.

“When ripe, it is carefully harvested, and carried by the workers, chaff and all, into the granary cells, where it is divested of the chaff and packed away. The chaff is taken out and thrown beyond the limits of the paved area.

“During protracted wet weather it sometimes happens that the provision stores become damp, and are liable to sprout and

spoil. In this case, on the first fine day, the ants bring out the damp and damaged grain, and expose it to the sun till it is dry, when they carry it back, and pack away all the sound seeds, leaving those that had sprouted to waste.

“In a peach orchard, not far from my house, is a considerable elevation on which there is an extensive bed of rock. In the sand-beds overlying portions of this rock, are fine cities of the agricultural ants, evidently very ancient. My observations on their manners and customs have been limited to the last twelve years, during which time the inclosure surrounding the orchard has prevented the approach of cattle to the ant-farms. The cities which are outside the inclosure, as well as those protected in it, are at the proper season invariably planted with the ant-rice. The crop may accordingly always be seen springing up within the circle about the first of November every year. Of late years, however, since the number of farms and cattle has greatly increased, and the latter are eating off the grass much closer than formerly, thus preventing the ripening of the seeds, I noticed that the agricultural ant is placing its cities along the turn-rows in the fields, walks, in gardens inside, about the gates, etc., where they can cultivate these farms without molestation from the cattle.

“There can be no doubt that the particular species of grain-bearing grass mentioned above, is intentionally planted. In farmer-like manner, the ground upon which it stands is carefully divested of all other grasses and weeds during the time it is growing. When it is ripe, the grain is taken care of, the dry stubble cut away and carried off, the paved area being left unencumbered until the ensuing autumn, when the same ‘ant-rice’ re-appears within the same circle, and receives the same agricultural attention as was bestowed upon the previous crop, and so on year after year, as I *know* to be the case, in all situations where the ants’ settlements are protected from graminivorous animals.

“After receiving this account, Mr Darwin wrote to

Dr Lincecum, asking him whether he thought that the ants planted seed for the next year's crop, and received the following answer:—‘I have not the slightest doubt of it; and my conclusions have not been arrived at from hasty or careless observation, nor from seeing the ants doing something that looked a little like it, and then guessing the results. I have at all times watched the same ant-cities during the last twelve years, and I know that what I stated in my former letter is true. I visited the same cities yesterday, and found the crop of ant-rice growing finely, and exhibiting also the signs of high cultivation, and not a blade of any other kind of grass or seed was to be seen within twelve inches of the circular row of ant-rice.’”

INDUSTRIAL COMMUNITIES.—THE PARASOL ANT, ETC.

“Broad columns of these ants may be seen marching along, each individual carrying in its jaws a circular piece of leaf about the size of a sixpence, which is held vertically by its edges. The use of these leaves is to thatch the domes of their curious edifices, and to prevent the loose earth from falling in. Some of these domes are of gigantic dimensions measuring two feet in height and forty feet in diameter. The mightiest efforts of man are small and insignificant in comparison when the size of the builders is taken into consideration. Division of labour is carried out to a wonderful extent in these buildings, for the labourers which gather and fetch the leaves do not place them, but merely fling them down on the ground and leave them to a relay of workers who arrange them in proper order, covering them with little moulded pellets of clay analogous to brick.

This species of ant presents us with the best type of an industrial community. There are, as is usual with all ant societies, and with most human societies, three distinct ranks; we have here the aristocrat, the soldier, and the working man; here, too, as with mankind, all the burden of life, all the

drudgery and toil, falls to the lot of the indefatigable labourers. The other two castes live mostly a life of pleasure. The nobility, the bright winged males and females whose only function is to propagate the race, in pleasant weather amuse themselves by aerial promenades and Terpsichorean *matinées* in the warm sunshine. The soldier classes, whose duty it is to defend the state, can of course take but little part in these festivities, but as an offset to this deprivation they help themselves most liberally to the delicacies of the state larder and sideboard, which are usually stocked to overflow by the labouring masses.

Among the parasol ants this military or governing class exhibits a further diversion, some of its individuals wearing a polished horny translucent helmet, while with the others the head is opaque and covered with hair; these last have further a very curious eye in the middle of the forehead; they never manifest the least disposition to fight, or even to defend themselves, when attacked. Their function in the state is probably that of teachers or moralists. These two individuals, so closely connected in life yet so different in appearance, are in short analogous to the *knight* and the *monk*, those two great characters in human mediæval history.

The inference is my own but the evidence is strong; the relational anatomy of insects, like that of all animals, is divided into muscular and nervous portions; hence it follows that when the function of ruler differentiates it must do so subject to these conditions—there will be a muscular or material sovereign and a nervous or spiritual sovereign—that is, a king and a priest. [These two structures, so ponderous and important in early ages, are in the latest and most advanced social organism, the United States of America, nearly atrophied. I was forcibly impressed with the fact last summer when, on a visit to the American Brighton, I attended the little church on Sunday to hear a *methodist sermon* and see *President Grant*.]

The nourishment of ants consists of every possible kind of vegetable and animal substance ; their favourite food, however, is a sort of delicate honey which is gathered by certain plant-lice, the aphides. These little insects have two small tubes protruding from the posterior portion, out of which the ants draw the precious liquid. The process is very similar to that of milking a cow ; by a gentle stroking from the antennæ of the ant the patient and most amiable aphide is constrained to give down the coveted delicacy. Nor could the most shrewd and thrifty of farmers exercise better judgment in the selection of his cattle, or take better care of them, than do the ants of their little milch-cows. When the leaf-stalk upon which they pasture is found to be exhausted or wilted, the willing creature is forthwith carried to a fresh green one. Artfully constructed passages connect these leaf-pastures with the ant-city, into which at intervals the aphide is conveyed by the owner, who builds a special room or stall in the nest for its accommodation, so as to have his valuable cow always at hand.

While after this fashion a portion of the workers of the ant-state are devoted to cattle-raising, or in providing the community with other food, others are engaged in repairing, cleansing, or enlarging the immense dwelling in which the entire society together lives. What are our palaces, our asylums, our casarnes, and our Pacific hotels, compared to these structures, where so many thousands of individuals live freely together. The house of the ant is rough outside, truly, but hidden within are wonderful labyrinths, hundreds of halls, corridors, and staircases, which connect together thousands of most comfortable rooms and chambers. Many of these are used as nurseries in which the young brood are brought up.

The care of the young children falls to yet another class of workers. These child-nurses exhibit the most tender love for their little charges ; each day when the sky is clear they convey

them out into the fresh air, bringing them safely back to the warm nest as the cool of the evening comes on.

THE BATTLE-SCARRED VETERANS.

Besides these peaceful *industrial societies* just described, which so nearly resemble our own modern ideals of the state, there exist ant nations which approach rather to the ideal of antiquity—that of the *military state*. Such societies, in which every man is a soldier, must either be supported by slaves, as was the case in ancient Greece, or else subsist by war and plunder (murder and robbery), as did ancient Rome. To this last order belongs the famous Eeiton of Africa. The great mass of individuals composing the Eeiton state serve as common soldiers ; the few of larger stature, further recognisable by their immense head and stronger weapons, act as officers and command the army. There is usually one officer to each company of about thirty men. When upon the march, the officers are distributed at intervals upon each side of the long columns ; they are seen running backward and forward, often mounting to some overlooking point a-head, from whence to guide and direct the troops. The word of command, as well as all other communication with these, as with all ants, as far as known, is not by articulate or tone-speech, but by touch-language and by gesture-language. The feelers especially, by nod and wave, contrive to telegraph to those in the distance, while to those nearer, it is by actual contact that wishes, feelings, and thoughts are expressed.

These marauding armies of ant-rovers unite together in vast hordes, and by the inhabitants of their land are more feared than were the Huns and Vandals of olden time. All living things that come in their way are killed ; lizards, snakes, birds, rats, monkeys, pigs—no matter what—are remorselessly seized and put to death. Woe be to the human being who is unlucky enough to cross the track of the advancing host.

Instantly he is surrounded by a dense black myriad,—thousands with incredible rapidity and fury mount his legs, and bury their dagger-jaws deep in the flesh. The only plan of action in such a case is to run at top-speed until the main body are too far off to renew the attack. Those which have once fairly taken hold never let go, and have to be pulled to pieces in order to be detached.

The attack of these fierce Liliputian troops upon a human dwelling-house is thus described:—

“On the approach, the house is quickly deserted by its owner. The ants sally forth in vast columns, a hundred yards in length. Presently the vanguard of the column approaches; a few scouts precede the general body, and seem to inspect the premises and ascertain whether they are worth a search. The long column then pours in, and is soon dispersed over the house. The scene that then ensues is most singular. The ants penetrate into the corners, peep into each crevice, and speedily haul out any unfortunate creature that is lurking therein. Great cockroaches are dragged unwillingly away, being pulled in front by four or five ants, and pushed from behind by as many more. The rats and mice speedily succumb to the onslaught of their myriad foes, and all other living creatures fare no better. In a wonderfully short time the robbers have completed their work, the scene of turmoil gradually ceases, the scattered parties again form into line, and the procession moves out of the house, carrying its spoils in triumph. The raid is most complete.”

There is one great mental quality which, more than any other nations, the Ecitons have cultivated; the *reckless courage* which this race exhibits is without a parallel in the universe. It will not hesitate to attack *anything whatever* in heaven or earth. Let not the school-boy swell with pride at the acts of his sires at Thermopylæ.

Fire will frighten almost any creature, even the Spartans; but it has no terror for the Eciton-ant, who will dash at a glowing coal, fix its jaws in the burning mass, and straightway shrivel up with the heat.

Thus fearful and blood-thirsty as are these nomadic hordes when upon the war-path, most amiable and gay do they appear when, in bivouac under some shady tree, they give themselves over to rest and recreation.

THE SLAVERY QUESTION.

Still more remarkable than these military states, are the so-called Slave States of the Amazon. In these the entire labour is performed by slaves. These slaves are individuals of certain smaller races of ants, and having been stolen in infancy and brought up in the foreign lands, they are forced to take upon themselves the entire labour of the state. The Amazons never work themselves, their only laborious occupation in life being slave-hunting. Sometimes there is a severe struggle, but the Amazons always succeed in carrying off as many of the young as they require. The most curious part of the matter, however, is that when these are grown to maturity, they not only perform all the labour which their masters require,—building, procuring food, rearing young, &c.—but later they accompany the troops on their excursions against their own people, and aid them in their robbery, and rear their own stolen relations to the duties of servitude. The Amazon ant, by this course of living, has grown to be incapable of taking care of himself. In one notable instance, when a number of them were confined in a glass case, together with some larvæ, they not only were unable to rear their young, but could not even feed themselves; so a great number died from hunger. By way of experiment, a single specimen of the slave-ant was introduced into the case, when the state of affairs was at once altered. The tiny creature undertook the whole care of the family, fed

the still living Amazons, and took charge of the pupæ until they were developed.

“When we declare the perfect national organisation of the bees and the ants, as well as the various other relations in the economy of animal life, and particularly the division of labour, to be the result of blind instinct, we must with equal justice pronounce it blind instinct by which the North American Indian builds his house out of buffalo hides, while the South American constructs his of palm branches and banana leaves. It must also be by blind instinct that the South Sea islander lives chiefly on fish, while the Chinaman eats little but rice, and the dwellers on the Pampas subsist on a diet of beef. It must also be but the results of blind instinct that the people of Europe possess a monarchical form of government like the bees, while the people of America have a republican form like that of the ants.”

THE YOUNG SHOULD FORM GOOD HABITS.

The true explanation of these things is here as elsewhere. All that have life are forced into certain habits by surrounding circumstances; and these habits become second nature, and are transmitted to offspring. The struggle for life ever tends to fix these habits more firmly, and hence, little by little, through the ages, all the manifold forms, functions, and organisations have grown up.

Should you ask the cause of any marvellous thing connected with life, the fierceness of the lion, the swiftness of the horse, the social organisations of trees, insects, and men; the faith of the clergyman, the skill of the artist, and the belief of the philosopher; the unutterable love of husband and wife—I would reply, *It is the force of habit*, strengthened by inheritance.

The last paragraph may be placarded, “True, but dangerous.” It is dangerous to all near-sighted persons who conceive it clearly, but do not see beyond—do not see that, though true.

it is not the whole truth, being in fact just half the story. It is the one oar which, on being lustily pulled, straightway upsets the boat.

It is urgently demanded in the present crisis, that we find and bring also to bear the other oar. This may be sought in the answer to the question, What makes the geometrical form of crystals?—an answer that is not forthcoming.

CHAPTER IX.

THE ANTHROPOLOGICAL AGE.

AGE OF THE BIPEDS.—ANTHROPOIDA, PITHECANTHROPHI,
ANTHROPI, EMBRYONIC HISTORY OF MANKIND.

“There are a great many men at the present day investigating the road which has brought man up to his present state, and I confess to a curiosity in the matter, and I do not say that their researches may not be of benefit. I do not participate a particle with those that dread the idea of man having sprung from some lower form of existence ; all that I ask is, that you show me how I get clear from monkeys, and I am quite satisfied to have one for an ancestor fifty centuries ago ; only make the difference wide enough and I am content. I look upon the Patagonians, or the miserable crawling Esquimaux, and I don't see much to choose between them and any latent animalhood. I don't care so much about that thing, I had no “early associations” a great while ago. I have not the least recollection of what happened a million years ago ; all my life is looking forward. I want to know where I am going to, I don't care where I came from.”—*Henry Ward Beecher.*

“Quæ fuit durum pati,
Meminisse dulce est.”—*Seneca.*

I AM going to make a plea for progress.

Is a high or a low origin preferable? The great source of satisfaction and pride to the “self-made man,” is the contemplation of his humble birth, and the successive steps by which he has risen to eminence ; while through both press and pulpit, his biography is cited as an example for the rising generation. On the other hand, there is scarcely a more pitiable spectacle than that of the son of a distinguished and noble man, living a mean and sordid life—a youth of low inclinations, a degenerate or debauchee.

“We have only the choice of two alternatives. We must either suppose that man was created in a civilised state, ready instructed in the arts necessary for the conduct of life, and was permitted to fall back into the degraded condition which we witness among savage tribes; or else that he started from the lowest grade and rose toward a higher state of being, by the accumulated acquisitions in arts and knowledge of generation after generation, and by the advantage constantly given to superior capacity in the struggle for life. Of these alternatives, that which embodies the notion of continued progress is most in accordance with all our experience of the general course of events.” *

If, as anthropologists teach, the early progenitors of the human race were nude savages, speechless and cannibal, if Europe and America in the beginning were but a howling wilderness, it will be evident that the history of civilisation is the history of progress; at the one end stands the tattooed idiot, at the other the acute and genial man of the world. What a change! What a hope for the future! Another turn of time's wheel and we shall sigh for no millennium. If, as tradition teaches, we, the men of to-day, are of but mediocre metal, common, democratic; if our ancestors, the men of the past century were gentlemen, men of spirit, glittering, polished; if back of them in the genealogy was nature's true nobility, and nature's purest virtue, races of kings, and chivalrous knights and holy priests; and, if still farther back in the grey dawn of history, the fathers of these talked with the angels, being *gods* themselves and demi-gods; alas! how has the earth degenerated!—at the one end of the course the shining God in a raiment of fire, at the other the fagged business man in a suit of black tweed.

The most unnatural and despicable conception of the human mind, is this “coming out at the little end of the

* Wedgwood's “Dictionary of Etymology,” new edition. Extract from preface.

horn ;" the most exhilarating and glorious conception which nature gives us, is expressed in the truth, that

" Tall oaks grow from little acorns."

Who could express the horror that a human life would be, if its course were reversed and it were lived backward? Imagine that a man was born at the advanced age of fifty years ; he passes on to the stage of a man of thirty, and must now feel that though his brute muscular force is increased, the faculty of correct judgment which truly makes him master of the world, the refined taste which experience having given him, enables him to enjoy life to the uttermost, have left him ; he is next in his teens, his views of all things distorted and preposterous—he is subject to continual failure and mortification, yet with the remembrance of his perfect manhood past ever oppressing him ; boyhood follows—he is a tyrant, a robber of birds' nests and apple orchards, and his highest pleasure that of burying his face in a plum-pudding ; and then the infant, the vague idiotic stare, helplessness, habits which brutes would be ashamed of, and yet backward three stages more, a living block—a formless lump—nonentity.

What do you say, young men, to becoming *savant* next New Year's eve instead of becoming intoxicated? Instead of exercising the muscles all night, try the nerves for a change ; instead of inaugurating the waltz for the coming year, we will found an Anthropological Society. We now have the credit of being fast, let us be faster. We now do at eighteen what our fathers did at forty—let us at twenty do what our fathers did at sixty. We might initiate a young Academy of Science. How would it do to have for a corner-stone of that edifice the scientific doctrine, that *the course of history is one of progress, and that consequently man is an elevated and not a fallen being ; that he is a perfected creature and not a degenerate divinity ; that his course is excelsior, onward and upward, and not downward.*

It seems almost idle to ask the British people to believe in evolution, it is like asking them to believe in sunshine. Such an idea is the most natural one possible to the Saxon mind. The most of us have a picture of the first rail-road train. In our day, we have read the history of the sewing-machine, the telegraph, the origin of our great men, the origin of our institutions, journalism, the dry-goods business, brokerage. We have seen with our own eyes the little beginnings of our newest metropolitan cities—Chicago, Montreal, San Francisco. Over every foot of British soil from London to the Rocky Mountains is engraved growth, development, *progress*, evolution.

If a person, twenty-five years ago, had patented the invention that man had come up from the jelly-fish, and had asked me what race was prepared to entertain his project, I should have said the Anglo-Saxon. That race has seen the *Times* and *New York Herald* come up from an origin fully as humble; the Behemoth that bears the sign of A. T. Stewart boasts, in comparison, no nobler a beginning. And in London and Liverpool we may count such houses by hundreds. It has many advantages over other races. It has no mouldering Corinthian columns and god-like statues invested by tradition with supernatural charms. We have no Rome and no Athens. The first settlement in the tangled wilds of the British Isle, a few generations ago, was very much of a jelly-fish compared with the noble and superbly organised empire of to-day. This notion of potentiality of beginning with nothing and ending with magnificence is especially and peculiarly "British." The idea of progress is the heart, soul, and bonework of the Saxon people.

It appears to me inevitable that when we get our Watt and our Morse in the moral sphere, it will be the "*doctrine of progress*" that will be the lightning and the steam with which they will produce a grand electric and transit system of ethics, education, philosophy, and religion.

Perhaps I am too sanguine, but it has struck me that such an invention would be a tremendous success, one that would shortly drive mental stage-coaches and post-horses entirely out of fashion, one worthy of bonfires, and orations, and of statues to the inventor.

The secret of such an invention is, as I have said before, that man has come up and not down, that he has "*come up*" from something or other.

I am not one of those who think it isn't of any particular consequence what that something was.

It by no means follows that all the absurd explanations upon the wind are to be accepted as truth. It does not follow, as some would seem inclined to suppose, that the origin of man is explained by the statement that "a squash became a cat," the cat a monkey, and this a man, or, what others would consider nearer the point, that our grandfather was a gorilla, and our great-grandfather a tadpole; not follow that the human race has in its development assumed successively the forms of every hideous natural monster, and will in the future assume the form of every supernatural one—Cyclops, Pegasus, and Gabriel; not follow that because we are, as we all feel ourselves to be, the creatures of habit, that we are now gradually to grow "weak-eyed and weak-legged," finally to lose legs and then thorax entirely, and "only a monstrous head remaining;" the ears developing at last into feet; result, a spider; and then another "long siege working up through the simiads again."

It is from such wildly drawn sketches as these, which appear in the current literature—that is, the newspapers—that the popular American idea of derivation has been formed; it is only natural, then, that the unanimous voice has been "*How absurd!*" No wonder that unwarranted conclusions have been drawn, when such ghost-scenes, instead of facts, form the premises.

"So," said an intelligent Richmond physician to me the

other day, "so you are an Evolutionist; you don't believe the Bible; you don't believe there's any God; you think when a man dies that is the last of him. I should hate to think my grandfather was a great big bull-frog."

I tried to smooth matters. "Yes," said I, "I am an Evolutionist; and I do believe in both God and the Bible; I know that we are immortal; and I know that my ancestors have been neither bull-frogs or any other species of animal." And the doctor seemed considerably surprised, and asked me to explain.

"All our ideas upon this subject," I ventured, "are false, and they have become so for this reason, we can conceive of any new thing only by the use of terms or images with which we are familiar; when we hear the proposition that man has descended from a lower creature, we immediately picture such lower creatures as we have seen and known—monkeys, cats, frogs, &c., the gorilla and the bull-frog generally having the preference—and so we gaze on the big brutes like the pair in the British Museum, and at the diabolical croaker in the frog-pond, and sure enough we are not instinctively drawn towards them as dutiful children ought to be toward a long lost parent, on the contrary, we deny the charge with vehemence and disgust—and we do rightly."

Two more impossible subjects could not have been chosen. The gorilla hasn't a particle of latent manhood about him; he is not a half-formed man, but a magnificently formed brute. He is the opposite of man, a very prince of brute muscular force and beastliness, the antithesis of nerve force and sociability. If any monkey at all, not the big ourang, but rather the *littlest* and most insignificant that can be found; such a one would be much more like a human scedling. But the fixing the mind thus upon any animal at all as an example, perhaps, only shows how ignorant we are of the law. When Nature once makes a type, clear-cut and crystallised, she never transforms it. If man had ever been a gorilla, he would be a gorilla

still. In the grey Piscean age Nature evolved the shark, a perfect type, and the shark still swims unchanged; in the following age conditions brought out the frog, and he exists to-day the same as then; and the great dragon was wrought out by a branch of the life stream, and he died and left no posterity—could not—he was a perfect creature, the type of his time; conditions changed, he could not change with them, and he went out of existence. “*Nature made him and then broke the die.*” The stream flowed on; again and again a portion of it branched off, as the branch of a tree separates from the trunk, and rounded itself into the complete flower; the lion, the elephant, the gorilla—these are the types of following ages, perfect each, though all different; conditions are changing, and their races are slowly dying, and from their specific and well-turned forms no new shape can come. You cannot have your cloth made up into a frock coat, and then remodel it into a sack when the fashion changes; when the gorilla dies, it will be the last of his ugly race.

The ages pass, and there is still something left of that life stream, the ocean of plastic plasma, which has so long been expending itself right and left, being worked up into these types. Have you ever observed the topmost branch of a flowering shrub? have you seen how it differed from all the others in its straight and direct connection with the root, while all others bend off in all directions? and have you observed how fair and perfect is this last formed branch, the apex, and how rare and perfect its flower? It is the very essence, heart, and soul of that plant; it has no connection with that gnarled, struggling limb which strays off half way down the stalk.

Now, all nature shows that the stream of animal plasma has flowed onward and upward in the same course, and by the same law, as this stream of vegetable plasma. Starting largely and rank in the beginning, it is gradually used up in making all these branches, the coarser parts always being drawn off

first, those crooked scraggy boughs the frog, the crocodile; and thus, as the current mounts, it must grow purer as well as less, until, in its last drops, like gold triple refined, we see upon the acme of the shrub—there evolves the most perfect of all, the soul, the refined ideal of the whole system.

What is the shape of this *life-stream*, this current of protoplasm? for it is this, and this alone, which has been the progenitor of man. The question is unimportant. It matters not to us, whether it has been formless, like the unorganised rivulet of water, or whether, in a vague way, it simulated vital forms. The latter view would be preferable; it would be hard and cold, if like the rivulet. Nor is it thus in the tree which we have taken as an example. Those currents are not altogether formless. Cut out a portion of such a current, take a simple splinter from the growing trunk; is it like that flower-stalk on the tree's top? a little, yet not much. Such a splinter from the tree is to the leafy twigs of that tree, and to the topmost flower-stalk, as the "ancestors" of man were to all the animals which we see, and to the flower-stalk man himself.

Such a plastic un moulded morcel of plasma, a vague indefinite embryo, but with untold possibilities, wrapped up within it, only waiting Nature's own good time to evolve the petals; such was our ancestor, such the dreadful ogre that has so frightened us, and called forth from our teachers the words of the terrible oracle—

"Mayest thou ne'er know of what thou art."

Immortal man, the image of divinity—now a glorious full-blown flower, was once but a bud, and earlier than this, but a mere sprout—an embryo, vague, simple. Can it be possible that this is the "fearful reality," which the doctrine of derivation exhibits? And you may know *exactly* what this bud or embryo was, and not be led away into misty speculations concerning the subject. You have no need to look abroad and

select disagreeable brutes as targets to fire man's paternity at. If you, being curious, would know Nature's secret exactly, you have only to study what you never did study—your own biography ; for it is mathematically certain and demonstrable, say the anatomists, that the growth of the individual repeats in miniature, and *must necessarily* thus repeat, the growth of the race. Say then to the sceptic : “ Know this, O despiser of Nature's ways ; and when next you deny the lowly origin of man, make all consistent. You have the best of rights to speak for yourself, as well as for others ; say that you were born a *man*—that you never were a child, an idiotic infant, an embryo at all ; say that you were born full grown. If you declare this as stoutly as the king of Siam denied the existence of ice, or as the Pope denied the rotation of the earth, depend upon it you will find believers.” The most degrading of it all is, that we ourselves were once infants, mewling and puking in the nurse's arms.

“ There are some men who, in life, are very much like what thistle-downs are in summer. God has at work under ground, vast engines, great coarse black roots, which crawl through the soil, and by their hidden power pump up large quantities of fluid into grass, and flower, and plant, and shrub, and tree. The great expansive force, the mighty suction, the terrific power of this tremendous enginery, is felt in everything that has vegetable life. It is the omnipotence of Almighty God, distributing itself through nature. A thistle-down is chased through the air by a butterfly ; they are wafted along, and they hold counsel together about the *vulgar violence of nature*. They are wafted along by Zephyrs, and they say, “ See how we live ! Says the thistle-down, I never was born. I was just lifted up one day, and I have floated in this way ever since. I just float and enjoy myself.”

It is equally impossible to think that you sprang from, and are daily sustained by, the coarse black roots of the *Zoological Gardens*—Messrs Thistle-down of the conservative aristocracy.

“IT MOVES NEVERTHELESS.”

The history of the great human embryo, those clusters of cells in the life-current, which at last have developed into the human race, is briefly told. At the beginning of life, a hundred million years ago, it was a cell, unformed, like an egg or a sponge. Towards the close of the first long geological age, signs of a head began to appear; in the following age, while ravenous fish and crawling crabs occupied the earth, still unformed, it moved floating about in the matrix of nature; here the limbs first made their appearance. In the two successive periods, when the dragon and the mammoth ruled, the growing man was surely there; little, insignificant, not like either of these, but a nameless thing. Doubtless it had a vague resemblance to the rest of the animal kingdom—the brain had not yet grown. Doubtless it nourished itself much as animals do, as do the embryos of insects. Very likely certain temporary appendages, as in the case of every embryo whatever, were formed; it is even not impossible that such temporary appendages were of that awful character, “pointed ears and a tail;” but is the lack of these all the difference between man and the brute? It was a *human* embryo still. By and by the time arrived—the Glacial epoch, birth. Adam was born—not in a day; the birth of the human race is a human birth on a grand scale. Thousands of years was Nature in the pains of labour, and half a million years the new born race remained in puling infancy.

“I don’t like the picture,” said I to the anthropologist, “that makes my ancestors, the new-born race of men, savages, *naked idiots*.”

“So is every infant,” replies he.

“They knew nothing, not even that fire would burn.”

“Neither do children.”

“They were speechless cannibals.”

“The new-born infant knows neither speech nor decency.”

"Such a spectacle is repulsive, that of the infant is agreeable."

"Doubtful if the latter part of the proposition will hold. But this we have 'seen too oft—familiar with its face,' the other we have never seen. Its gigantic size also painfully impresses us; a vicious ant seems less detestable than a vicious bull."

Whether pleasant or not, truth is the best possible thing for us to hear, says the anthropologist, far better than flattery, better than comfort, better than happiness, better than goodness, better than beauty. We need not dwell upon this subject if it pains us. The main thing is to study and fairly settle for all time the question as to origin.

This question whence we came, is the most important of all questions, because *only by knowing this can we tell where we are going*. "The object of education, if I understand it," says John Ruskin, "is that we learn where we came from, where we are going to, and what we had better do under the circumstances."

The necessity for the true solution of the first of these three problems, if we would reason correctly upon the two latter, and the uncertainty which ever must be attached to these while that first remains in doubt, will be evident from an example.

If I tell you, after the manner of Mr Emerson, "There has been a steady increase in the virtue, wisdom, and happiness of the human race from its earliest beginning," notwithstanding that all your experience goes to confirm it, you doubt. You have heard that Virgil was as good a poet as Dr Oliver Wendell Holmes. Happiness! "Abraham and Jacob milking goats and sitting in their tents were perhaps happier than we are at the Grand Opera or at Delmonico's;" "and as for goodness"—Oh! don't all the prophets, and legions of priests, and every saint in the calendar rise up and confront us? There are no saints nowadays, but few prophets, even the

number of priests is fast growing smaller and beautifully less. If I continue saying to you, "From the moment of your birth you have steadily grown wiser, better, and happier"—you hesitate. The sweet poetic phrases "happy infancy," "innocent childhood," rise unbidden in your mind, while all the sadness and the tenderness which, like moss and ivy, ever twine about and cover old ruins, and cheat us into thinking the originals were grand, make a prisoner of your emotion; what can the intellect, then, do in settling the momentous question—

"Am I lost, or am I not?"

Well, why not try the new system? Let us learn from our great men, from naturalists and scientists, fairly and squarely the truth of our origin; listen to them, if need be, as we listen to the sincere friend who tells us of our faults so that we may improve. When once we have heard that truth, have no fears for the consequences; it will be handed over to the poet quick enough, it will be covered with moss and ivy and twining flowers, and become a delight, though it be at first the hardest dismal crag that human eyes have ever seen. To change the figure, truth ought always to be the framework, the stays and rafters of our mental edifice, hard, naked, unvarnished. Feeling, religion, and poetry, should be the lath, plaster, and frescoing. Thus teaches the new philosophy. Let me briefly sum up, then, the few truths—the—

WIT AND WISDOM OF OUR ANCESTORS.

I.

Man is not descended from the monkey.

II.

Man is not descended from the gorilla, rat, cat, tadpole, or frog, or from any other of the animals.

III.

He bears the same relation to the rest of the animal king-

dom that the central axis and flower-stalk of a tree bear to the side branches.

IV.

The collective man, like the individual man, has gradually grown from the embryo.

V.

Such an embryo may have been furnished with temporary appendages for obtaining nourishment, &c., and when certain imaginative naturalists, in the first flush of discovery, call these things pointed ears, tail, hair, and gills, I say, let them have their own way; it don't matter a jot whether we had such temporary staging employed in our structure or not; it is not impossible that the human germ, then, as now, simulated in a vague way the lower animal forms.

VI.

The progenitor of man was not a monkey, he was an *indefinite incoherent homogeneity*.—See *Spencer*.

VII.

We certainly are related to the other animals, "for God is the father of us all," and hence each must contain a portion of the divine essence; perhaps the best natural proof is the beautiful vertebral column which we all possess, this is the silver thread upon which all vital forms are strung.

VIII.

That the simiads are our nearest relations, and the insects the most distant, is so evident that no child can fail to see it; this doesn't make either of them our brothers.

IX.

The other day I saw a hapless greyhound cut in two by the railway train, I caught his pleading frightened glance as he fell—a moment more and all was over, and I thought, it would

be selfish and unmanly in me not to be willing to say, "That little spirit has gone to its maker." *

X.

THE HORN OF THE DILEMMA.

Life is a strange thing. In other words, "this is an awfully funny world!" The fact is that it is funnel or trumpet shaped; the only difficulty is to find out toward which end we are tending.

XI.

The difficulty is settled by reference to origin. If the beginning was mean and petty, there is progress; a noble and glorious future is slowly dawning upon us.

XII.

If the beginning was grand and perfect, there is degeneration; the world is slowing going downwards towards stupidity, vice, and misery—perdition.

It is only by short-sightedness or "occupation of the mind" that we escape the deduction.

XIII.

In the human embryo at four months, the lower end of the vertebral column projects down several lines below the body; every one of us at that incipient age could a tale unfold. The best way to get rid of the horrifying fact is to deny it.

XIV.

The Italian nation made it a rule never to believe in anything that wasn't pretty. In the seventeenth century it died after an æsthetic illness of a couple of decades. Its epitaph should be: Died for want of truth.

Rome in 408.—"Ah, those Goths!" exclaimed Vetrano. "Tell me, Julia, is it not reported that the barbarians are really marching toward the city? Everybody has heard of it. The

* See the opinions of Professor Agassiz upon this subject.

Emperor is so disconcerted by the rumour, that he has forbidden the very name of the Goths to be mentioned in his presence again."

XV.

DESCENT OF MAN.

Man, "so like a god."—*Poet.*

Man, "the brute!"—*Woman.*

Man, the forked radish.—*Scientist.*

All three are right; only reverse the order, and you have it. Man begins as a vegetable, lives as a brute, and ends as an immortal.

INFANCY OF THE HUMAN RACE.

"The child is father to the man."

LEARNING TO WALK AND LEARNING TO TALK.

EAR-RINGS, THE GRECIAN BEND, AND OTHER PUERILITIES.

THE BEGINNING OF WISDOM AND THE BEGINNING OF VIRTUE.

LE GRAND ENFANT.

"Who can tell what a baby thinks?
Who can follow the gossamer links
By which the manikin feels his way
Out from the shore of the great unknown,
Blind, and wailing, and alone,
Into the light of day?"—*Bitter Sweet.*

The origin of man dates back a hundred million years.

The birth of man was but a half-million years ago.

Amid the throes and convulsions of the Glacial epoch man came forth from the womb of nature. In that age he came forth from the bosom of our genial mother, the great animal kingdom, which so long had nourished him, and must ever continue to furnish him with nourishment.

To translate this into the language of the day, we say that during this period there slowly rose into prominence, by the action of the same laws which we have seen all along in operation, a new race; that this race was forced in the struggle for

life to acquire new habits, which entailed certain peculiarities of structure—for example, a stronger posterior limb and a more perfect larynx—and that these being exceedingly favourable peculiarities, this new race became gradually the predominating one, as the other races had slowly grown to be in former times.

It was in Lemuria, that oldest country, where at this time the competition was most severe, and where only the brave and the strong could survive, that this race developed. Its numbers at first could not have been more than a few hundreds, perhaps not so many. In general appearance they were like none of the numerous races of men at the present time. By the help of fossil remains, and by analogy, anthropologists have been enabled to arrive at a very fair picture of what these rude forefathers must have been.

They were short of stature, and their habitual attitude stooping or bent, the vertebral column having but a single curve, instead of two, as now. Hips and shoulders were very narrow; the lower limbs were too short in proportion, like those of an infant; the calves entirely wanting, and the knee strongly bent inward; the arm reached nearly to the ground, and was much stronger; the head, according to the skulls found in strata, was one-half the size of ours, the forehead retreating as well as the chin; the nose tiny and flat, with an enormous breadth between the eyes—all of which traits belong also to the new-born babe. We may add, finally, that the hair was straight, and much thicker over the body than at present; the colour was a brownish yellow. The race had not yet learned to talk, and they have been properly named the *Alali*, “the mutes.”

Two great causes, as I have before intimated, enabled the human animal to succeed and gradually acquire mastery over the others. First, he was of all animals the noisiest; second, he acquired a habit of walking upon two legs instead of four. The habit of using the posterior limbs for support and loco-

motion only, thus leaving the upper ones free for attack and defence, was a good one. We must supplement this, however, with the important power of the *opposable thumb*, which enables it to grasp a weapon, and to feel *and to comprehend the form of things*. The thumb is the secret of civilisation. The growth of our peculiar kind of language (articulate), out of the broad emotional sounds (I will not call them howls) to which this new race most of all were addicted, was the other step.

There are three kinds of language exhibited in the animal world besides our own, the human, which we cherish so highly as to be scarcely aware of the existence of any other. These others are the language of gesture; the language of touch, carried to such perfection with the ants; and tone-speech, the language of birds, &c. The origin of the language of tones or notes, and of true words—the song of the bird and the sentence of the man—is the same. We see it in the strange yells so common to savages, extremes of delight, rage, love, fear, &c., and in the screams and chatter of the feathered tribes. The origin of both musical and abstract speech, or, as we term them, of music and language, is the instinctive escape through the air of the lungs of a strong feeling generated in the brain-cells. After long continuance and multiplication, the noises or screams become differentiated, as does all else; there arises a difference among them. There becomes such a thing as an *interjection*, and as a *note*—the *units* (or parents) respectively of language and of music; these units being branches of the *tone* or scream, the stalk common to both. The growth of language from the mere tone or noise is a very simple thing. We know that all animals when hungry utter some sort of a peculiar cry, and another cry of satisfaction at the sight of food. The emotions of love and fear also have their appropriate tones; the simple shortening and sharpening of them by long practice makes the interjection. It will readily be seen how by coupling them together in twos or threes simple propositions may be expressed. “*I want food,*”

"I *fear* an *enemy*," "I *hate* my *rival*." Thus nouns and verbs succeed interjections, and these are all the parts of speech that the simplest languages contain.

The race of men I have described were the most timid of all animals, and this fear made them ever crouch and cling together by the same instinct that rats heap together in the presence of the terrier. A mutual protection society thus formed, with grim death all around them, the race was driven, at the peril of extermination, to multiply and perfect those tones and interjections by which they could make each other comprehend the situation. The result of such a system of training was a most extraordinary and prodigious growth of the organ of memory—the head.

Man has got a memory, therefore he is a man. We have discovered his specialty. That of the lion is seen to be sharp claws and fierceness; that of the horse, swiftness, long legs; that of man, a big head, memory. This is the result of his having a thumb and a good larynx.

There is another art quite as important as language, which grew up along with it, or a little later, which must be noted.

LOVE, AND WHAT CAME OF IT.

You observe that very handsome barnyard fowl, the cock, as he flaunts his gay-coloured feathers in the wind, and shakes his graceful wattles and shows his æsthetically-carved comb, and you say these ornaments were supernaturally given him. But not so, *he made them*. The knight of the olden time certainly made the glittering mail and waving plume which he carried, and yet these were formed by the same law as the other. Certain feelings persisting in the race, have caused the gradual appearance of these things. You may depend upon it, the race of that scratching bird rose into existence, every one of its individuals being as black and plain as the homeliest old hen. What then? The law, "None but the brave deserve the fair." With the

birds, he must be not only brave, but beautiful, who wins. The cock has been obliged to comb, curl, and dye himself in order to win a harem. And each generation of the fair ones, the hens, have grown more fastidious in this respect. Who can tell the countless number of grey and ugly old bachelors who have died leaving no progeny?

None but the brave and beautiful deserve the fair. The horns of the deer are due to this law, *the strange gashes or creases upon the face of the mandril*, as also the odd, yet artistic manner in which he parts his hair. In the early history of the race, man, with his superior wit and two free hands, undertook in a high-handed manner, and instantaneously, to effect the results which, if he had waited for slow nature to aid, would have taken ages. He sought beauty by manufacture, instead of by agriculture. He took sharp stones and cut those desirable regular furrows in cheek and on arms and breast; and he made vital epaulettes upon the shoulders, and painted them by rubbing berries and leaves into the gashes. For wattles he hung bright bits of wood in ears and nose. I wish you could see the New Zealander as he stands even to-day, with all this sculptural beauty upon him. None but the brave deserve the fair. Time wore on. By easy transition these regular stripes and gashes were cut upon the shield and spear also, as well as on the person. How long fine art continued in this stage is not known; but one day there was glee in the savage heart—the same glee which the child first experiences when he discovers that the painted picture of a dog in the book is like a real dog on the floor—the savage discovers among his own rude marks something that resembles a tree or an animal: he has accidentally made an image or hieroglyphic.

This image multiplies; thousands of shields, and then the surrounding rocks are covered with these rude images. Differentiation comes, a branching. On the one hand, the images grow more perfect, more like the object, until they become

pictures and *statues*; on the other, they become less perfect, conventional, less like the object and still less, until all trace is lost. They are mere signs, *alphabets*; and these two limbs of the art tree have grown very great. We see the one in the works of a Raphael, and the other in the abstract tones of a Logic. Great results from little beginnings.

This brief analysis furnishes us with a broad and true philosophy of art. The one great human art is *expression*. This, as we regard it from the standpoint of form or of force, may be divided into two. (1.) *Graphics*, the art of design (painting, sculpture, &c.) and of written language. (2.) The *vocal art*, music of all kinds and spoken language. Each of these is again distinguished as exhibiting two branches, according as it appeals to the emotions or to the intellect, singing and talking, drawing and writing. These are the four arts of man.

Such divisions as the first (arts of force or motion, and arts of form) will be of great assistance to us in the study of national character.

Music and *lectures* are the Germanic arts; *pictures* and *literature* are more especially those of the Latins. Boston is famous for lecturers, and it has the big organ and musical jubilee. Paris possesses the great picture galleries and the largest library in the world.

In the course of the ascent of races through the geological ages, and in the ascent from lower organisms to higher, it will be observed that all the higher functions and structures, those which do not directly concern the support of life, are thrown away further and further from the vital centre, and become continually more ideal and less a real part of the animal. The house of the mollusc is attached firmly to his body—is in short, a part of him; the hut of the beaver is artificial, and no longer organic; the residence of the Londoner is in the suburbs, while his person is the chief portion of the time far away in the East End. That much-coveted feminine attraction the pannier, which the Hottentot race by ardent

cultivation exhibit in their society as a natural organ, a part of life itself, with the higher races, the Europeans, has come to be purely artificial and superimposed. It is a mistake to look to the dissolute age of Louis XV. as productive of that very curious structure; its origin dates back to mother Eve without doubt, and was in vogue long before the fig-leaf was ever thought of.

This organ, in fact, the most magnificent of the "sexual characteristics," extends down much deeper into nature than you imagine. Exceedingly popular among the Simiads—with the mandril it is of a beautiful crimson colour—it is yet still more in vogue with the birds, where, appearing in the shape of *tail plumage*, it flaunts its most gorgeous proportions. I shall not take advantage of my position in the cloudy heights of science to make a fell swoop down upon the earthly follies and fashions of the day. I consider it in bad taste, nay, useless. It is the fashion which makes science, not science which sets the fashion. Woman—bless her!—will have her own way; and so long as she insists on remaining what she is—our bird of paradise—I know of no more fitting adornment. Some day she will doubtless rise above it, and then, of course, as all men do, I shall follow her. In the mean time, pretty bird, if you will wear them, get good ones—buy the polonnaise. "It weighs but seven ounces, is a perfect cushion to the back of the wearer, can be used as a pillow in travelling, is a perfect life-preserver, and will' outwear any other fifty bustles in the market; grace, comfort, and utility combined."

Amateur Botanist.—"Capital! The violets, too, practise the Grecian bend, and wear a bustle."

The history of all art, both useful and ornamental, is the same. It begins as a *secretion* of plasma, as seen in the house of the snail, the clothing of trees and of birds. The second stage is the *action of muscle*, showing as products the bird's nest, the hut of the savage, &c. The final stage—the arti-

ficial or ideal—is the *action of nerve*; a book, the productions of a Raphael. Personal ornaments offer us the best illustration. The modern *belle* orders her bracelet of the jeweller, and causes its peculiar form, style, &c., by mere words. A half-million years ago she would have taken a sharp stone and carved upon the flesh the ornament; while back of this, in still more primitive ages, it could only have been produced in the Hottentot fashion—a slow growth by continued selection of the fittest.

INVENTION'S MOTHER—NECESSITY.

The first weapons of the human race were stones and broken branches. Competition, the pangs of hunger, sharpened them into tomahawks and spears. The race increases, and spreads to every part of the earth. The wolf we have always with us. Bitter cold forced us to seek caves and jungles for shelter, forced us to draw nearer to and wrap ourselves up in the coarse grass and leaves of the forest. For our lives we were forced little by little to a habit of braiding that grass into great mats, like that of the New Zealander. We have now become proficient in the art—the exquisite broad-cloth coat of the shops shows a pretty fine braid. Death to the weakest! death to the stupidest!

By the merest accident the two sticks brought sharply together produced fire. Accident repeated grows to be habit; accident first ran the melted metal into some useful form—an axe, a spear. We are proficient now—practice makes perfect. The rolling log, the floating branch, and the broad leaf were the first carriage, the first canoe, and the first basket. Take now a little walk through your own kitchen among the utensils, a short ride to Boston by the Narragansett steamers and the Old Colony R.R., with this in your mind; you will be pleased to see how much progress there has been in the world.

THEIR PATHS DIVERGE.

Competition, emigration, decimation. The course of the

human race in its rise into power was the same as that of all others. Immense multiplication as soon as the type became fairly formed and perfect enough to hold its own among its enemies. Competition next, and there was a crowding and thrusting out, and northward from old Lemuria, till every spot of land was populated. Changed conditions next worked divergence of character. Those who had been forced into the extreme frigid north remained dwarfed in size, hardy, but rude shaped and dull; they became Esquimaux. Another great stream poured off into Africa. Intense heat in the long ages resulted in lack of red blood-corpuscles in the system, and consequently of oxygen, the carbon of the plasma not being burned appearing at the surface; hence the colour.* Life was easy. Your genuine African needs do but one thing—"find a melon, break it in two, eat the middle, sit in one-half of the shell, and put the other half on his head." There has been least advancement among these races; a few hundred thousand years served to fix the Negro type much as we now see it. Time and the fifteenth amendment will show whether that type is too far crystallised to change. Others on the yellow plains of Asia found different conditions, and gradually evolved the type of the Mongol. To the law of the brave and the fair is due the twisted eyes and pinched feet, and various other modifications. But it was that portion of the tribe which flowed towards the east of Asia, out over that Asiatic peninsula politically called Europe, which changed and progressed most. Here, in the thickest of the fight, ever between two fires, grew the little white species, agitated, nervous, and ideal. Here also the rule of the fair has made itself felt; for "blonde or brunette," and straight or curling locks, flat nose or sharp, were once the topics of fashion as costume is now. Here, on this narrow neck of land 'twixt

* Dr Draper. The law of the brave and the fair, however, is the *ultimate* cause. The African ladies have queer tastes—they *prefer* black husbands.

the great Mongolian and African seas, has stood the little group of whites; enemies and competition have driven them first to the taming of animals, and next to agriculture, and then to an industrial life; while every day and every hour the great wolf hunger, competition, forces further division of labour and further progress. "Competition is the life of trade," it is life itself.

INTELLECTUAL EXPANSION.

The savage hears the wind, and sees its effects. He dreams as all animals do; unlike them, he remembers his dreams. He sees the action of the earthquake and of fire. And in his infantile imagination he conjures up strange forms for all those natural forces. He becomes a genuine spiritualist;* and as time wears on, these vague imaginations take still more definite shape. Man may be said to create gods in his own

* "The real and fraudulent phenomena of what is called spiritualism are of such a character as to make a profound impression upon the credulous and the ignorant. Such persons having very little knowledge of the forces inherent in their own bodies, have no difficulty in ascribing occurrences which do not accord with their experience to the agency of disembodied individuals whom they imagine to be circulating through the world. In this respect they resemble those savages who regard the burning-glass, the mirror, and other things which produce unfamiliar effects, as being animated by deities. Their minds are decidedly fetish-worshipping in character—and are scarcely in this respect of a more elevated type than that of the Congo negro, who endows the rocks and trees with higher mental attributes than he claims for himself." —*Hammond*.

The spiritualist, the same as the savage and the maniac, is a *dreamer who never wakes up*. Mediumship is a disease, one of the phases of lunacy. The woman who is developing clairvoyance or clairaudience in herself, is simply inducing hallucination and mania, as one might induce gout or St Vitus's dance. And in bringing up her child "to be a medium," she is making her a monomaniac, as she might make her a dyspeptic or a consumptive. When the contagion is widespread, and consists of a community, and having a mouthpiece, a newspaper, it presents us with the startling spectacle of *organised lunacy*. Such a growth in the social organism is analogous to cancer or other malignant growths in the animal organism. —See "Magic Staff," "Universology"—excellent subjects for the mental pathologists.

image—Apollo, Neptune, Jupiter ; and finding by long experience that he cannot beat the representatives of these gods into complying with his wishes, he now beseeches and prays them to favour him. As time passes, all these gods are in his imagination gradually merged into one ; and this is not formed as the others, on the plan of man's body, but as he conceives, rather after the fashion of man's soul or mind : the beggings and beseechings become less frequent, and are not for trivial favours, but only for greater ones—life, health, &c. Time's experience is the great true teacher. At last he learns that prayer and petitions can avail nothing unless he *obeys the laws*—it is the story of the stone broth—and the idea of the *great sublime law* is the last term of the series. This takes the place of a spirit, conscious, and consequently capricious, like our own. The *law* is blind, pitiless as Niagara, *yet always to be depended upon*. It may be symbolised by the falling stone. We call it also “force,” “the great cause,” “the unknowable.”

SOCIETY IMPROVING.

The greatest success of the human species I have not yet narrated. This is that growing *division of labour* among collections of its individuals which we call society. In the early history of the race three functions were necessary for the support of life—*procuring food*, *defence*, and *thought* or direction. The first societies were simple families, consisting of a female, the father, and his many sons, or rather the younger members ; the relationship was somewhat indefinite—female children were strangled as soon as born.* This primitive type of society must have been the common one all over the world, and must have endured for many thousand years. It is, like that of many insects, a case of “blind instinct,” the instinct of self-preservation. Such a system of political economy, with the simple corollary of *eating* one's enemies, was the best which the times afforded. That also has improved.

* See M'Lennen, Primitive Marriage.

The oldest of this community served as *chief*, an office afterwards differentiated; and the others were divided into *labourers* and the *home guard*. These three social classes became in time the three great social classes—(1) The governing Church and State, (2) The industrial, and (3) The military. King and priest, the soldier and the slave, these are the photographs of history. We have lost them all. Business man and labourer, scientist and artist—these are the new types, a great improvement in my opinion.

PROGRESS IN MORALITY.

The savage is cunning, treacherous, bad; he does to others exactly what he does not wish them to do to him, and this is the case with brutes. True morality, the *fellow-feeling* which alone will inspire right conduct, is of slow growth. The utter simplicity of the origin and development of this quality, about which so many volumes have been written, makes its comprehension easy. A person said of a friend the other day, "That man is reliable." This explains the whole mystery. When men are reliable, when men can trust each other, the community holds together; when the contrary is the case, it falls, and becomes the prey of the enemy. Men have been forced to honesty by the wolf, as they have been forced to the attainment of every other life-giving quality, and yet the work goes on. We are forced every hour to do to others as we would that they should do to us, and this is the essence of virtue.

"Virtue alone is happiness below," and to be virtuous is to do as you would be done by. This is, at least, good, fair, respectable morality—doubtless in the days of Greece and Rome it would have been considered magnificent. It is but the beginning, the rudiments. I pity, indeed, to-day the conservative who is satisfied with so miserable and shabby a standard. How different this is from the fiery "enthusiasm of humanity" portrayed in "Ecc Homo" I need not say; how

different the sentiment from that conveyed by the noble words of Comte, "*Live for others*"! Thus we have progressed. The tender emotion is grafted upon the old notion of utility; *that divine love which the mother feels for her child, that love developed until it embraces all humanity.*

One word more remains to be said. The growth and spread of this all-embracing love which shall make us as the angels is not and cannot be cultivated directly. We cannot force the heart by the mere wishing or trying to feel. It is only by the *cultivation of the intellect*, by enlarging and liberalising our views of life, that our sympathies can be extended. We cannot love where we do not understand; we can have no fellow-feeling when we do not know how a fellow feels. The average German considers the average Frenchman as a puppy utterly unworthy of his respect; the Frenchman looks at the German as a sort of wild beast whom he expects, as in the last war he expected, it would be necessary to fight with the butt-end of the musket. The German and the Frenchman do not understand each other, or they would be the warmest friends on earth. Such a friendship would then exist as that between a noble man and a beautiful woman. It is no joke, but the naked truth, to call the bombardment of Paris, and the whole war, "a slight misunderstanding." It is ignorance, and nothing but ignorance, that *in the present day* is to blame for all the war, and all the brutality, and all the crime, both public and private. An increase of sympathy changes all this, *and sympathy can only be enlarged by an enlargement of the brain.* To be a good man one must be a wise man. The doctrine of evolution, say the German doctors, is the greatest step in this direction since Socrates. The maxim which then turned the world in a new and noble direction was, "Know thyself;" that which now opens a new career for humanity is, *Know thy fellow-creatures.* The knowledge of evolution makes us kind not only to the whole human species, but to everything that has life.

CHAPTER X.

PSYCHOLOGICAL AGE.

THE AGE OF IDEAS.

FROM THE FOUNDING OF THE PYRAMIDS TO THE MATURITY OF SOCIETY, A.D. 10,000—AN EXTRAORDINARY EPOCH—WHO IS THE MASTER SPIRIT OF TO-DAY?—IS IT THE POLYP?

“Let the past guide, the future cheer,
While youth and health are in their prime;
But, oh, be still thy greatest care
That awful point, the present time.”

“WE live in an extraordinary age.”

A great truth dimly comprehended by the writer of those words; the horizon of his vision was too limited. I have tried to show you how different the ages must appear under the newly-invented glare of telescopic and microscopic illumination, and how indifferent our bagatelle civilisation must seem when, instead of a supernatural creation of four thousand years ago, we see the world slowly growing throughout immeasurable time, and life gradually developing itself through a hundred millions of years.

How shall we characterise the short and fleeting age in which we live? the age of “civilisation,” “those few thousand years, the description of which we are accustomed with comical short-sightedness to call the history of the world.”

Thus far in the course of our evolutionary narrative we have called each rising age after the name of the greatest

power which upheaving life should at the time present. We have named the natural historic ages after some dominant race of animals. Thus we have had fifty million years' reign of the Vermes. The thirty million following was a reign of Fishes—the Piscean age. The next eleven million covers the Reptilian dynasty—the age of the Dragon. During the two million following, the Mammoth and the Elephant, the *brute par excellence*, predominated—a Brutal and an Elephantine age. While in the half-million just passed we beheld the animal Man, by means of his new-found organ the thumb, outstripping all competitors and peopling the whole globe, and we rightly called it the age of Man. We have thus made a characterisation of the times in accordance with certain dominant *individuals*, of which the *acranian*, the *fish*, the *reptile*, the *brute*, and the *man* (that is, the animal or savage man) are the types.

This order of classification will not apply to the age we live in. Notwithstanding the amazing change in nature within the past four thousand years, no new animal superior to man has arisen. We have no type for this age, no name for it—unless we call it the age of Woman. There might be found good grounds for this. Where is the man, be he artist, man of business, or man of giant intellect, that is not in reality ruled by feeling, sentiment? and woman is the queen of sentiment.

“ Love rules the court, the camp, the grove,
And men below.”

Historically considered, her case is very strong. If the position of woman continues to become exalted in the future at anything like the rate it has advanced in the past—granting that she began as the slave of a brute—that future will show not an equality, but woman the ruler, the subordinate man; and there are advantages in her favour that none but the naturalist dreams of.—No, I am mistaken. Woman herself has discovered the awful secret, already she knows wherein

lies her strength. Read the following from the pen of the New England schoolmistress :—

THE POWER OF WOMAN.

“The subtle and mysterious attraction that everywhere draws men to women is a sacred trust committed to women by the Creator. It is not only a power irresistible, but a possession inalienable. By no misuse or disuse can it be forfeited. It is not beauty, nor wit, nor goodness ; for the attraction exists independent of all these. It is simply womanhood. Man pays deference to woman instinctively, involuntarily, not because she is beautiful, or truthful, or wise, or foolish, or proper ; but because she is a woman, and he cannot help it. If she descends, he will lower to her level ; if she rises, he will rise to her height.

This is the real danger—not that she will drive him from her, but in that she cannot drive him from her. She cannot help being his blessing or his bane. She cannot make herself into a being he will not love. If she is insipid, ignorant, masculine, coarse, then he will love insipidity, ignorance, masculineness, coarseness, and be himself deteriorated. So much the more ought woman, by the virtue of this mysterious and inalienable power, to rise to the height of wise and worthy exercise. Instead of making it merely the minister of her own indolence and vanity, it should be made to minister all human grace and succour. Instead of regarding it as a reason why she may dispense with all prudence and wisdom, it is the reason why she should concentrate within herself every resource of prudence and wisdom.” *

To sustain the proposition that this is the age of woman would, nevertheless, be premature. As I look at it, in fact it would be trivial and incorrect ; for by man, as I have used the

* See how womanly inspiration and science are of accord. “Through-out nature the law is, that the male shall seek the female.”—Compare “Descent of Man,” vol. i., chap. viii. Sexual Selection.

term, I have meant the human race, and man and woman in my sense are but halves of a whole. The question is still open, who is the coming race?

No new races have been born within the Psychological age thus far, except the dog, the mule, and the pigeon; these are all inferior.

"Is it certain that no superior race will hereafter arise?"

"Yes."

"How do we know?"

Such a race could only come up by slow degrees, and such a growth the intelligence of man would not permit. If the eagle or the ant, by some lucky habit, should begin to acquire power, man would take steps while it was yet in the bud, undeveloped, to crush it out.

Does it not appear plain that the Lord of Creation, with his present absolute authority and growing keen-sightedness, will continue to have dominion to the end? Can you reasonably imagine any of the numerous creatures we have passed in review rising slowly and unobservedly in some spot of creation too remote to be disturbed? No. Can you imagine the growth of a creature or race under his very eyes which, gradually usurping, shall finally overthrow his power, and assuming earth's control, again change the face of nature, and give the age a new aspect? The question is preposterous; the intelligence of man, again you say, would not permit it. The intelligence of man? Ah! there is perhaps the very thing we are in search of. It is this something *within* man which is now becoming master, which has made man not only superior to all nature but superior to himself.

Let us begin again the work of classification and see if we can find out where this Intelligence, this new creature comes from; we shall thus learn something more of its nature than is yet known.

If, instead of using the individuals, worm, fish, reptile, &c., for our purpose, we observe the progress of that higher organ-

ism or individual, *Society*, the social organism, it will give us a different basis, and a slightly changed nomenclature. The first and second ages might then be united together and called the Age of Social Plants; so the third and fourth would be united in one greater, the Age of Cœlenterata, or that of society of the lowest animals. The fifth, the Anthropological, would in this view be the Age of Insect Society; and so our present is the era of "Humanity," the Age of Human Society.

The past age was that of man—the individual, solitary, egotistic; the present, is that of the unit—the man in mass, altruistic — the *State, Society, Humanity*. These names describe in a word the present, and the opening future. Such a conclusion will please the majority; it is the positive and orderly one. Let us, however, seek the inevitable *other*, the progressive or destructive one, that we may compare the two and choose.

We will now look at the progress of life neither through the organism of the first degree, the Social, nor that of the second, the Individual, but with a view to the evolution of the much neglected but all important third order, the *Organ*. Here we have a deeper and surer basis.

During the first age of life, all organs were rudimentary; then throughout the whole animal world, there was to be found no head, and but little heart—a headless and a heartless age, veritably. The age of fishes might, with equal felicity, be called the age of *limbs* (fins); here, for the first time the invention of these appendages gave life a new vigour; while in the next, the appearance of *lungs*, no less than the appearance of reptiles, marks a new era.

Our lungs are thus seen to be a comparatively modern invention—they are but thirteen million years old. Fifty million summers our hearts have seen, and the irrepressible stomach a hundred. But to continue:—

In the days of the mammoth, the lion, the cave bear, and

the hyena—it is very evident that it is *muscle* which wins—the race is here to the swift, and the strong, and the enduring ; an iron age was this indeed, and we are not yet wholly emancipated from it, for the lion and the rapacious eagle are still our national devices, and brute force too often takes the place of moral suasion ; nevertheless, to put the brightest side out, what is it in this new light that is the sovereign of the present ? We have only to look at our own overgrown and oddly shaped heads, to find a reply. To the reign of muscle succeeds the reign of nerve.

Here then is the solution of the important question of the difference between man and the other animals. Of the red life blood he has less ; of muscle not as much or as good ; of the snow white nerve he has more and better. To say that he has more intelligence, is but to repeat the same thing in other words, for intelligence is to nerve or brain what motion is to muscle (and to speak with less precision, speed to the horse and fierceness to the lion stand in the same relations), each are admired separately, as beauty of form and beauty of action, yet both in truth are one.

The reign of brutes has passed ; even man, the highest, has had his day. Jupiter is overthrown. Who, then, reigns ? I will give you two pen portraits of the present sovereign, as seen respectively by

AN IDEALIST AND A REALIST.

“ Man is no longer what he was, and what, perhaps, he would have done well to remain, an animal of superior grade, happy in thinking and acting on the earth which nourishes him, and beneath the sun which gives him light. On the contrary, he is a prodigious brain, an infinite spirit, of which his members are only appendages, and of which his senses are simply servants.”

We have arrived at our “ progressive ” conclusion. Let me translate it into another language. It is a misnomer to call

the brain longer an organ ; it is an independent creature, a new animal that naturalists have not yet discovered—dynamically an infinite spirit, but statically an animal.

To what class does it belong ? It is a carnivorous polyp. The brain is a polyp that has grown up amid a sea of blood plasma, instead of in a sea of salt water,* hence it is the highest developed of the whole polyp tribe. Shakespeare has declared man to be a little kingdom. The realist pronounces him to be a little lake—not a rocky salt lake of water, but a bony lake of blood—the pasture of a certain species of the zoophyta. Compare the brain-coral to the creature inhabiting the human polyp-pond. Is not the analogy too close to be mere accident ? Does it not declare a brotherhood ?

The acme of zoological speculation is reached. The *zoophyta*, and not the *mammalia*, are masters of the earth ; the *polypus* and not the *bi-mammæ*, are the lords of creation.

Thus has proud man been fairly outwitted and overthrown by the very lowest of creatures. Hereafter, in speaking of man, we mean the nervous zoophyte.

BOTH ACCEPTED.

The unblushing dissector reminds us of Artemus Ward. Doubtless at the moment, he is “figgeratively” speaking. After due consideration of the matter, however, I think we might, with the most cheerful alacrity, take him at his word.

We accept the polypus. Be careful ! Do not for an instant suppose that the reign of this creature on earth is a retrograde movement in nature. On the contrary, it simply announces a new creation upon a higher plan, and a new order of things. This new despotic creature is built of *nerve*,

* L'agent, à son tour, se subdivise. . . . d'une part les solides qui agissent, et, de l'autre les humeurs qui maintiennent ceux-ci en état d'agir, qui sont les conditions d'action, qui jouent par rapport aux solides le rôle que le milieu extérieur joue par rapport à l'organisme total. . .
—Ch. Robin et Verdeil, *Chimie Anatomique*, t. 1, p. 13 et 14.

and not of *protoplasm*. As the plasmic zoophyte is the beginning of animal life, so is the nervous zoophyte the beginning of another life, the spiritual.

That the brain will become differentiated, and some day organised, we have every reason to believe, and then, and not till then, will phrenology become possible.

Phrenologists do not deal with that complex, though rather degenerate order of animal, man, this is the ground of the physiologist; their work is with the brain, and this, quite the contrary, is the very lowest of creatures, *homogeneous, indefinite, incoherent*, as every dissector knows. Those little cells and crystals, the nerve images composing it, are, I grant you, perfect, wondrous; so are the cells and crystals of every other lowly organisation; doubtless these are the most wonderful of all; could phrenology read these, there would be some hope for the science.

The forms of intelligence! the forms of mind! I am never thoroughly unhappy, except when thinking of that undiscovered and unknown world of beauty. Alas! for our blindness, day by day, age after age, we listen to the voices, the forms of which we have never seen. Dare you doubt it? Do you doubt that all the Shakespearian and Titian marvels are rolled up in that crumpled sheet of grey matter in the cranium, if our dull eyes were only sharp enough to pierce its infinitely tiny folds? How much more perfect than their crude counterfeit of book or picture, no pen can tell. What can a miserable steel stick, or a bunch of bristles do, but *caricature* such wonders? Rest assured, that for every bright word that issues from human mouth, there must be a bright starry image in human brain—a form not ideal, but tangible, visible as are the images of the camera or on the retina. Our grandfathers would not have believed that succeeding generations would invent a machine that would see like the eye; yet the camera in use by every photographer is nought else. We do not now believe that man will yet invent a machine that

will remember and imagine and reason as the brain remembers, imagines, and reasons ; yet the one is no more incredible than the other.

There is a photographie apparatus, a vital camera obscura in each of our eyes, as every one knows ; there is a piano, or something very like it, in the ear, as all may learn by consulting the latest editions of physiology ; that there is a vital museum, library, picture-gallery in the head, need no longer remain a doubt. Where is the steady hand that will put the scalpel on it ?—that is the question. Who is the acute dissector that will lay it open and expose it to our inspection ?

THE FOUR KINGDOMS OF NATURE.

Du Chaillu thus speaks of the gorilla :—

“ Then the underbrush swayed rapidly just ahead, and presently before us stood an immense male gorilla. He had gone through the jungle on his all-fours, but when he saw our party he erected himself and looked us boldly in the face. He stood about a dozen yards from us, and was a sight I think never to forget. Nearly six feet high (he proved two inches shorter), with immense large chest and great muscular arms, with fiercely-glaring large deep grey eyes, and a hellish expression of face, which seemed to me like some nightmare-vision. Thus stood before us the king of the African forests.

“ He was not afraid of us. He stood there and beat his breast with his large fists till it resounded like an immense bass-drum, which is their mode of offering defiance. Meantime giving vent to roar after roar.

“ The strength of the gorilla is evidently enormous. A young one, between two and three years of age, requires four stout men to hold it ; and even then, in its struggles, it bit one severely. That with its jaws it can dent a musket-barrel, and with its arms break trees from four to six inches in diameter, sufficiently proves that its vast bony frame has corresponding muscle. The negroes never attack them with

other weapons than guns, and in those parts of the far interior where no European guns had yet reached, as among the Apingi, *this great beast roams unmolested, the monarch of the forest.*"

I never hear man called an animal without feeling like asking the animal's pardon. I should like to have a convention of animals and learn their opinion upon the subject. The right honourable gorilla, monarch of muscle, should preside; speeches by those superb brutes, lion, buffalo, eagle, and elephant. I should like to hear them say how much of the animal man had left in him—should like their opinion of "a man of the world;" their opinion of an animal, the colour of whose body had degenerated to that of a potato-sprout, whose bones had dwindled to insectile slenderness, and whose muscles were of the consistency of cheese, instead of hard rubber; whose decaying teeth had to be propped up with gold and pewter, and whose failing eyes had to be supported with spectacles, and whose dainty nose and tongue required alternate tickling and goading with smelling salts, jockey-club, ice-cream, and Worcestershire sauce; whose pampered stomach demanded soup before meat, coffee afterwards; brandy between meals, and tobacco all the time, or refused to labour,—a creature utterly denuded of nature's covering, and forced to swaddle himself in linen, and wrap himself in broadcloth, utterly incapable of masticating his food without the aid of fire and carving-knives, or of eating without the assistance of a complete apparatus of knives, forks, teaspoons, and china—a creature that, with untold difficulty, produced an offspring that lived to be half-a-dozen months old before beginning to exhibit a particle of sense, &c., &c., &c.

If man is an animal, he is assuredly a most contemptible specimen. Unless we are willing to assign him a place well down in the scale, a good way below the monkeys, I see no help for it but to make a new kingdom for his especial benefit.

You know the categories; the mineral, vegetable, and animal kingdoms; shall we have a fourth—the human?

Not exactly. The fact is, these old-fashioned divisions of nature are not so scientific as we could wish; they do well enough for children, but we begin strongly to suspect that they are superficial, a good deal like the old-fashioned division of animals into birds, beasts, and creeping things. It has been strongly suspected, for about a hundred years, that the digestive system of an animal belongs to the vegetable kingdom, as much as does a tree; that pearls, shells, and teeth are minerals—crystals. In short, that a man deprived of limbs and medulla is a plant; that reduced to a skeleton, he is a mineral.

Biologists separate the man into two parts—the vegetative and the relational. They have overlooked *the most important part of all*—the crystalline. It may further be remarked that, in the not-far distant future, if not at present, the relational will be susceptible of distinct division into legislative and executive. This deeper glance into the composition of things suggests a new classification.

1. THE CRYSTALLINE KINGDOM.—To this kingdom belong such individuals as cohesion has succeeded in fairly locking up, thus placing them beyond the power of further rebellion, life, or motion. Diamonds, pearls, and emeralds, quartz, marble, and granite, bones, shell, wood, the foraminiferæ (life without organisation) are good examples.

2. THE VASCULAR KINGDOM.—The living part of all plants, especially flowers, corals, medusæ, earth-worms, &c., all headless animals; the digestive and sanguine tracts of all higher animals. The cohesive force is here partially overcome, and there is a slight degree of motion.

3. THE MUSCULAR KINGDOM.—This may be called the super-vital; the iron-master, condensation, is here set at defiance; motion is integrated, hoarded, and organised. To see a deer bounding over the plain, you would think he could never be brought to death except by accident.

4. THE NERVOUS KINGDOM.—Motion in its most concen-

trated and powerful form. We half fancy that the *running* deer is eternal, we are still more strongly convinced that the *thinking* man is immortal or that some portion of him is. We are delighted and charmed at the function of muscle, at the performance of nerve we are dazzled and spell-bound ; the thought that in a single cell of nervine there lies a power able to shake half the vital world, is the most awful that we can conceive.

It will be seen that no creature of any considerable importance belongs exclusively to any of these four kingdoms. The axis of the plant belongs to the crystalline, its leaves and flowers to the vascular ; the skeleton of man is made up of crystals, his body is an overgrown flower, his limbs belong to the animal or muscular kingdom. What then shall be our rule for determining in which kingdom an individual may be classed ? We will simply place him in that department or kingdom, under that idea, which in his organisation we find strongest represented. As art models in each division we may take, 1st, the frost on the window pane, and the flowers of gypsum found in the Mammoth Cave, &c. ; 2d, the blossoms of dicentrā, violet, and pea ; 3d, the tiger, the gorilla, and *homo barbarus* ;—the 4th and highest kingdom comprises only two members, the ant and civilised man.

Perhaps I am wrong to place this little person on a par with a human creature. Is there not, however, as wide a gulf between the ant and the tiger-beetle as between man and the tiger ? The truth of the matter is, that our information concerning these people and their nations is so scanty, and our knowledge of their intelligence is so limited, that we are incompetent to judge either *pro* or *con*. We must consider ourselves ignorant of their understanding until we understand their ignorance.

With regard to ourselves, at any rate, there can be no question ; between civilised man and the brute there is an impassable chasin, a difference as great as between the brute and

a crystal of quartz ; an incalculable overwhelming difference of degree.

Man is not an animal. I have shown what he is ; in the language of the Spiritualist, an Infinite Soul, a Great Spirit, or as the Materialist would prefer to put it, a hemispherical polypus of omnipotent nerve-marrow.

“ There’s nothing great on earth but man ;
There’s nothing great in man but mind.”

The head of man is an epitome of the universe, and it is lord of all ; it feeds upon and tyrannises over the animal and vegetable man to an extent that threatens their total destruction. The man of to-day consists essentially of an expressive face embedded in a suit of black woollen stuff ; there is nothing left of him but what can be delineated in a Rembrandt photograph. He is a walking vignette.

THE TWO HUMAN FAMILIES AND THEIR BRANCHES.

The two categorical classes or types of mankind are the dark and the light. The best test of affinity or relationship among races is a comparison of the hair. Papuans and Hottentots belong to the *tufted*, Negroes and Caffres to the *fleecy* branch of the woolly-haired human family (Ulotriches). American Indians, Esquimaux, Chinese, &c., with the coarse hair, and Jews and Europeans with the soft flowing locks, are members of the Lissotrich family—the smooth-haired.

There appears to be a certain fixedness in these two types, as though Nature never intended to change them (the distinction in regard to hair being the most persistent. The leopard may possibly change his *spots*). The lower races, it is maintained by some, are incapable of advancement, and the question arises as to whether Nature has not made this wide distinction of type from the very first, whether there may not have ever been, in all time past, as now, the Negro and the white man.

The answer of science is plain on this point, however ; it says: Nothing in the Universe is fixed or changeless; all have grown to greatness from small beginnings. All things in the beginning are homogeneous.

When the human race first arose, some five hundred thousand years ago, in Lemuria, that sunken continent in the Indian Ocean, it numbered but a few hundreds, and was as perfectly homogeneous as a tribe of a hundred Australians of to-day.

The first difference appears only when, after considerable multiplication, certain numbers emigrated to Africa, and certain others to Asia, where each branch of the divided stream found different conditions—climate, soil, and forced habits of life, and this among men is consequently the deepest and oldest distinction. The crude and the slender, the black and the white, the woolly and the sleek, the African and the Asiatic—(The Caucasian or white race are modified Asiatics—Europe is but an Asiatic Peninsula). These capital differences, which conditions, such as climate, &c., have produced, is no less marked among the lower animals than among men. The African elephant and the Asiatic elephant are quite unlike, the former being a comparatively stupid creature. The African and Asiatic apes offer still more striking contrasts. The gorilla and the chimpanzee have woolly hair, broad flat noses, wide prominent teeth, and long heads, a general coarseness and a face of midnight darkness, very different from the slick-haired delicate features of the brown-coloured gibbon and ourang, their Asiatic brothers.

Thus the Asiatic races, of whatever grade, are the superior, the most refined, and the most advanced. We, the Europo-Asiatics, are like almonds and oranges. The Africans are like cocoa-nuts and bananas—and the reason lies in the conditions belonging to the two continents. The more northerly one has a cooler climate, “a soil which repays labour but does not reward idleness,” and being larger, the struggle for life—competition, which is the life of progress—has been more severe.

You and I, reader, have been fortunate ; if our very venerable grandparents had by accident turned their faces to the left instead of the right, we should now, to a certainty, all have been benighted Ethiopians, while the "Nigger" would have been the Chinaman and the Indian and the Caucasian. We were born to good luck. When the two first exploring expeditions, driven by hunger out from their birthplace, turned one to the right and the other to the left, we were of the right.

The children of the other multiplied, and spread from Sahara to the Cape of Good Hope, but *our* forefathers covered and possessed the greater land from Spain to Japan.

A few were driven far over the little neck of land and Behring's Straits, down by the back way, as it were, into a new world as big as both the others. These became "American Indians."

"It has long been a favourite notion with certain European psychologists, that man, physically considered, man the 'forked radish,' man the animal, degenerates and dwindles in the Western World. Those who hold this notion fortify it in a variety of ways. They point to the facts, which nobody can deny, that sundry kinds of wild beasts found in the new continent are less ferocious and less formidable than their congeners in the elder hemisphere. The American tiger, for example, is indeed but a kind of tom-cat in comparison with his Oriental cousin, who swims great straits of the sea and depopulates whole peninsulas. The American lion roars you, as it were, a sucking dove by the side of the Numidian king of the deserts. That men are less likely to be caught up by lions and tigers in the New World than in the Old will hardly, perhaps, be thought by everybody a conclusive argument against the fitness of the New World for the development of humanity. But there are those who seem to think so, nevertheless. It is alleged, too, that a positive physical deterioration can already be perceived in the races transferred from

Europe to America. The sterility of Massachusetts, the shrill nasal squeak of the oracular New England voice, the elongation of the extremities in Americans, as compared with Europeans of the same blood, the contraction of the American thorax and pelvis, are all pleaded against the memory of Columbus and of Cabot. The Castilian in Cuba and Mexico, the Portuguese in Brazil, the Frenchman in Canada, have suffered, we are assured, a like sea-change with the Briton in the United States. And now it begins to be implied, and even in some quarters to be asserted, that this degeneracy is appearing in the intelligence and in the morality, as well as in the physical nature, of the transplanted tribes."

A comparison of the Mongolian race types in the old and new world—the Turk and the Chinese with the American Indian, who is of the same blood—offers a still stronger confirmation.

With America, at the age of which I speak, we have nothing to do. If the above lugubrious picture be true, however, it perhaps points to a more perfect maturity for this backward terrestrial child in the great future; every continent, no less than every dog, must have its day. But, again, to continue our old world narrative.

New distinctions arise as time moves on; those of the left wing, in the south become Hottentots, in the central country, Negroes—with woolly hair, the long head, coarse features, black skin. Those of the right wing, the Asiatic, in the far east acquire harsh straight hair, yellow skin, pyramidal heads, diagonal eyes; those in the west, slender limbs, regular features, and the thick head.

This latter species, as time wore on, found itself between two fires. There was the great Mongol on the one hand and the "almighty nigger" on the other.

This high pressure is the cause of all our greatness.

To the inhabitants of the *middle land* first came the habits of industry and art.

In the fertile valley of the Nile began the first agriculture, and the nucleus of a new organisation, that of society or civilisation. Higher up, over the mountains, on the banks of the Indus, a thousand years later, another also began to flourish ; thus the Mediterranean species of itself became differentiated into the Semitic and the Aryan.

The former was far in advance in the course of progress. The Pyramids and the cities of Nineveh and Babylon, and a sacred literature of considerable proportions slowly grew up, yet long before Parthenon, or Pantheon, or gothic cathedral appeared. The Semitic civilisation was precocious, and it vanished, and our own, the greater, European, has the stage. *Vive la Race.*

Two things make the man—birth and education. The negro is now receiving the same education as we are, but the white man abhors the Negro, and ever will. In the opinion of observers, when the species shall become sufficiently advanced to dispute territory, the war of black against white will be the most bitter that the world has ever seen ; for *blood will tell*. The Negro is not our brother. That peculiar type, the crystal or creature, which we call Negro, was created under Africa's burning sun, while our own was trimmed and shaped by northern forces. The Chinaman is nearer related ; he was once our brother, but ill treatment has estranged us. In infancy he took from us the lion's share, beat us and crowded us out upon Asia's meagre cast-off peninsula, while he monopolised the continent. We have disowned him. More than a hundred thousand years ago he sank to a thirty-ninth cousinship. The Semite, be he Arab, Hebrew, or Egyptian, is our brother, our elder rival brother, yet we have but little to thank him for ; born both in Hindostan, the ways of each immediately diverged. Our long and backward infancy was passed upon the Indus ; his bright and brilliant boyhood on the Nile. You and I, reader, perhaps cannot remember the Indus ; it is some distance back ; one imagines that he cannot

recollect a hundred thousand years, yet in a certain sense he is mistaken. There are the marks of that river and of that early life upon your constitution, and there are still cells within your body which, handed down from father to son, were first formed there (you must read Pangenesis). And the sluggish Nile, with its bulrushes, should be equally hallowed to the Hebrew heart, as that "dearest spot," one of those sweet scenes of childhood which first gave character an impress. "Shall the Nile valley or that of the Indus produce the coming man?" might have been an important question in those days, and the Nile won it.

Well, our elder brother has had his day, and he is dead and gone, and we of the Indus respect his memory, precisely as each individual of us respects the memory of a dead relative ; we magnify his virtues and do not see his faults. Our dead Hebrew brother has grown to be our ideal, our dream ; his memory we reverence and we worship. All his words are treasured up and cherished, and his history and feats of boyhood and of manhood, especially all his pretty childish ways, are dwelt upon, with the same sweet sad tenderness with which a mother thinks of the traits of her lost one. The Hebrew is our darling and our angel. We delight to trace the course of his young life, though that of our own be forgotten ; and this is but natural, for he is dead while we yet live. When we too are gone let us hope that we may be thus appreciated. The coming race may teach their children in the Sunday school the lives of little Socrates, and little Hesiod, and of little Aristotle, as we now teach ours the story of little Isaac, and Joseph with his coat of many colours, and that of Moses in the bulrushes. Is the thought a sinful one ?

FOUR GREAT RACES.

Alas ! for poetry ; on closer inspection we find this fancied relationship is unreal. Time changes all, obliterates all ; even the dead are finally forgotten, for the living absorb all

our attention. The sentiment of affection for the dear ones made so keen by their loss gradually fades. Our children feel it less, and after a number of generations the aged tombstone stands without a single visitant, where formerly it was daily watered by tears. A strong natural cause for this grows out of the fact that the dead are with every generation less related, and of less interest to the living. The ways constantly diverge. Brothers to-day, their children are but cousins, and next second cousins, and so on; and with regard to the dead, we cannot expect our child to feel the same interest in the grave of uncle John which we feel in the memory of brother John; and to our grandchildren that grave will be but as that of a stranger. Observe the law in practice on a grand scale, and we find that with the long lapse of ages the Semites too, no less than the Chinaman and the Negro, no longer bears to us any relationship. All is like the tree's branches, constantly diverging, and thus, of two similar races, it will at last be found that scarcely a drop of the same blood animates both, scarcely a thought of the one touches a similar chord in the breast of the other. The types have become fixed upon different bases, and no amount of similar conditions can hereafter cause them again to converge. During the half million years since the beginning of the glacial epoch the four types, the Semite, the Negro, the Chinese, and the European, have been forming; there is grown a fixedness or persistence of character that the few thousand years we call history cannot much change. We feel instinctively that the Jew is foreign to us, that there is something in him which is persistently different from what is in us. If we believe him to be the superior race, however, it is well for us to study and to try to imitate his character, and the true way to accomplish this is thoroughly to master his early history. And to make assurance doubly sure, this history and its example should be taught to the young and plastic, instead of the examples and early history of our own race. We

shall then have done all we can to accomplish the object. One other natural fact is to be noted. It is by the study of the *infant* Jew race that the child, in becoming a man, will become most like the *mature* Jew race as we see it to-day. The work will be accelerated by calling the child by a Hebrew name. A man's own name sometimes exerts a considerable influence in the formation of his character.

I wish that I dared to tell here my own Puritan experience, but I refrain. This only I will say, that I was not thus fitted out in life I owe to my mother's protesting tears. "Aunt Rebecca, if you name that child Jacob, it will kill me," she said, and she won the day.

The hardier product from the banks of the Indus disputed inch by inch the Mediterranean soil until it remained alone the possessor. Four thousand years sum up the world's civilisation. During the first half period of two thousand it was the Semitic race which held sway and flourished, while the Aryans were still in the embryo, insignificant, persecuted; but their turn came, and during the next two thousand they have played their part. The race of the future will most likely be a select portion of our own—at least it cannot be the North African, for it is dead. We can profit by the lessons which its career affords; the lessons which are told by its ruined sculptures, and by its literature. The latter is most complete. That splendid series of legends and lyrics which collected and bound together compose the Bible, with the Koran and the Arabian Nights, form together a grand epitome of African life and thought. Supplemented, as they should be, by the studies of the temples, palaces, the sphinxes, pyramids, and obelisks, they are the child's treasury of knowledge, and should go hand in hand along with the grammar and arithmetic. They are the stepping-stones to the study of humanity, as these latter are the foundation-stones of science. This preliminary stage of education passed, the higher culture follows, *scientific*, in the supercedure of grammar, arith-

metic, and geography, by astronomy, geology, biology, and philology. In *religious* or humane culture, Moses, Job, Mahomet, &c., are succeeded by our own inspired writers, the Rig Veda, Zend Avesta, the Volsungs Saga, the works of Homer, Virgil, and Dante, Racine, Skakespeare, and Goethe. These form the religious code of the European race.

Let us now sum up the characteristics of the leading human types.

Among the twelve species of men,* the three which merit particular attention are the Mediterranean, or fair ; the Asiatic, or yellow ; and the Ethiopian, or negro.

“The Mediterranean, to which we ourselves belong, is chiefly distinguished by the beautiful form of the head, which approximates to a perfect oval. It is also remarkable for variations in the shade of the complexion and colour of the hair. From this species have sprung the most civilised nations, and such as have most generally exercised dominion over the rest of mankind.

“The Mongolian, or Asiatic species, is recognised by prominent cheek-bones, flat visage, narrow and oblique eyes, hair straight and black, scanty beard, and olive complexion. This race has founded mighty empires in China and Japan, and occasionally extended its conquests on this side of the great desert, but its civilisation has long appeared stationary.

“The Negro race is confined to the south of Mount Atlas. Its characters are black complexion, woolly hair, compressed cranium, and flattish nose. In the prominence of the lower part of the face, and the thickness of the lips, it manifestly approaches the monkey tribe. The hordes of which this variety is composed have always remained in a state of barbarism.”

Define next the two races of the great Mediterranean species to which we belong.

* See Hacckel.

THE SEMITIC RACE.

THE SEMITIC TYPE—RAWLINSON.

“The forehead straight, but not high ; the full brow ; the eye large and almond-shaped ; the aquiline nose, a little coarse at the end, and unduly depressed ; the strong, firm mouth, with lips somewhat over-thick ; the well-formed chin ; the abundant hair and ample beard, both glossy and black,—all these recall the chief peculiarities of the Jew.” It is also the type of the ancient Egyptian, and it is that of the Assyrian and the Arab. All these peoples constitute the Semitic or North African race, in distinction to the light-coloured Greeks, Italians, Germans, Celts, English, &c., the Aryan or European race.

SALIENT POINTS OF SEMITIC CHARACTER.

“Their character is religious rather than political, and the mainspring of their religion is the conception of the unity of God. Their religious phraseology is simple, and free from mythological elements. Their religious feelings are strong, exclusive, intolerant, and sustained by a fervour which finds its peculiar expression in prophetic visions. Compared to the Aryan nations, they are found deficient in scientific and philosophic originality. Their poetry is chiefly subjective or lyrical, and we look in vain among their poets for excellence in epic and dramatic compositions. Painting and the plastic arts have never arrived at a higher than the decorative stage. Their political life has remained patriarchal and despotic, and their inability to organise on a large scale has deprived them of the means of military success. Perhaps the most general feature of their character is a negative one—their inability to perceive the general and the abstract, whether in thought, language, religion, poetry, or politics ; and, on the other hand, a strong attraction towards the individual and personal, which makes them monotheistic in religion,

lyrical in poetry, monarchical in politics, abrupt in style, and useless for speculation.”*

THE EUROPEAN RACE.

“THE ANCIENT ARYAN.—A very noble variety of the human species. A form tall, graceful, and stately; a physiognomy handsome and pleasing, often somewhat resembling the Greek; the forehead high and straight; the nose nearly in the same line, long and well-formed, sometimes markedly aquiline; the upper lip short, commonly shaded by a moustache; the chin rounded, and generally covered with a curly beard. The hair evidently grew in great plenty, and the race was proud of it. On the top of the head it was worn smooth; but it was drawn back from the forehead, and twisted into a row or two of crisp curls, while at the same time it was arranged into a large mass of similar small close ringlets at the back of the head and over the ears.

“Of the women Xenophon remarks that they were remarkable for their stature and their beauty.

“The Aryan races seem in old times to have treated women with a certain chivalry, which allowed the full development of their physical powers, and rendered them especially attractive, alike to their own husbands and to the men of other nations.”

“PERSIAN POETRY.—Exaggeration, exuberant unrestrained imagination, glitter, far-fetched conceits, want of seriousness.

The Persian was a stranger to dignified reserve. . . . He laughed and wept, shouted and shrieked, with the unrestraint of a child who is not ashamed to lay bare his inmost feelings to the eyes of those about him. Lively and excitable, he loved to give vent to every passion that stirred his heart, and cared not how many witnessed his lamentations or his rejoicings.”†

“Sow a number of seeds of the same vegetable species in different soils, under various temperatures, and let them germinate, grow, bear fruit, and reproduce themselves indefinitely each on its own soil, and each will adapt itself to its

* M. Renan, as cited by Max Müller.

† Rawlinson.

soil, producing several varieties of the same species, so much the more distinct as the contrast is greater between the diverse climates."

If you plant a certain seed in the valley of the Thames, you have a fine Drumhead cabbage ; but plant the same seed in the valley of the Mississippi, and in a few years it grows instead a tall weed like a mulein-stalk. And the men who have in these regions grown up from the same human seed—the Saxon race—are not less different in their natures than the cabbage and the colewort.

The beginning of European history shows us a number of human beings alike in their disposition, habits, and culture, wafted by nature like seeds up from the Indus and the plateau of Iran and across the Caucasus Mountains, spreading in divergent streams out over the great Asiatic peninsula upon the shores of the North Sea, and upon that of the Atlantic, and down upon the three sides of the Mediterranean. Here on these coasts the seed took root. It is the waters which have made these lands what they are ; and it is the continued influence of these waters and of the soil and the air which has shaped the character of these people, who in the commencement were so homogeneous. There has grown a North Sea, and an Atlantic, and three Mediterranean varieties of the Aryan species.

The sunny blue waters of the Mediterranean Sea are often contrasted with those of the cold and dangerous Northern Ocean ; and this contrast is also that of the Latin and the Germanic peoples. Had we grown up on the banks of the sparkling Middle Sea, we, like the Greeks and the Latins, would have been joyous and careless, instead of the sombre and hard-working people that we are.

Of all the seed sown, that scattered in the Grecian Archipelago was the first to flower. The long boot-shaped strip of land above next followed in the production of the social plant. And as these bright and precocious, but not deeply-rooted, ones

gradually dwindled and sank, the wave of fructification still moved on, and Spain and France already in the middle and modern ages are in full blossom. Yet in the northern fields there is still only rank weedy growth. Now for the first time, and after long and painful preparation, it is England and Germany which are in the flower. The five great European flowers are alike in many respects, and in many they are different; they offer the best examples on a grand scale of the power of culture, habit, and circumstance in modifying and changing those qualities and tendencies which spring up spontaneously in the organism, an inheritance from common parents. The slow and sombre Teuton and the alert and *spirituelle* Italian of to-day, but a short time ago were brothers, and together tended the flocks upon the plateau of Iran. It is the North Sea and the Mediterranean Sea that have thus changed them, until in character they seem the very antipodes.

THE GREEKS.

“What singular influences were those in soil, or air, or sea, or in the combination and ‘natural selection’ of rare qualities of race, which produced that wonderful people of artists, and poets, and thinkers, and statesmen?”

No climate in the world is as delightful as that of Greece, and this is unquestionably the chief cause of their rapid development. A cold climate dooms its inhabitants to perpetual labour, and they remain long in barbarism; a hot climate, on the contrary, reduces the people to a state of dreamy inactivity.

The soil of Greece is meagre, it offers no inducements to agriculture; the great extent of sea-coast constantly invites. The Greeks were poor farmers; they were sailors, pirates, traders, and travellers from the first, and they rapidly grew acute and polished by contact with the world.

There was nothing vast about the country. Rock, mountain, and stream were small, picturesque, easily seized by the

mind, which thus formed ideas clear cut and well-proportioned ; add to this the serene gaiety and enjoyment of life which the sparkling waters, and unrivalled sky and atmosphere, could not fail to inspire, and you have the Greek character complete. They were the artists of the world.

What were the causes which gradually broke the power and dwindled the genius of this people ?

“ We know that fatal political dissensions weakened the Grecian communities within, and that successive hordes of conquerors plundered and wasted the country and expelled the inhabitants. Roman and Slavonian, Teuton, Arab, and Turk, have either desolated Greece or mingled their blood with that of its ancient race.

“ We find still further that these successive devastations have at length affected the climate and productions, and the Greece of modern days is not at all the woody, salubrious, well-watered, genial country pictured as the Greece of old. The forests have been burned and turned into sheep-pastures, and the encroaching desert climate continually drives the wood high up the mountains.

“ The destruction of luxuriant natural vegetation has brought on them changed conditions. The want of wood on the arid and calcareous soil has increased the heat and dryness of the air ; the springs have become scanty, and the parched earth draws no moisture from the atmosphere. The deficiency of wood and water has obstructed manufactures and tillage, and this has recoiled on the people.”

But the wave of progress rolls on. Next come

THE ITALIANS.

M. Taine, in his “ Notes upon the Colosseum,” speaks of the ancient inhabitants, the Romans, as follows :—

“ No people have more abused man. Of all the European races none have been so destructive ; only in Oriental countries do we find similar despots and devastators. The dis-

tinctive trait of a Roman life—first a triumph, and then the arena—is here revealed.

“There was in the Roman a sort of haughty, calm self-confidence, a serene pride in, and consciousness of, being able to do and to bear more than other men. They have always lacked a sentiment of justice and humanity; and not alone in antiquity, but also in the Renaissance and in the Middle Ages. They have always comprehended country after the manner of the ancients—namely, as a compact leaguc useful in oppressing others and turning them to profit. You laud their energy, good sense, and genius; you agree that the plant man is born more vigorous in Italy than elsewhere. This is isolating man as artists and naturalists do, in order to contemplate a fine powerful animal and a bold expressive attitude.

“The complete man, however, is man in society, and who develops himself therein; hence the superior race is that disposed to social intercourse and to progress. In this view, gentleness, social instincts, the chivalrous sentiment of honour, and rigid Puritanical self-consciousness are priceless gifts, perhaps the most precious of all. These are the qualities which on this side of the Alps have formed societies and an order of development. It is the lack of these qualities which beyond the Alps has prevented the consolidation of societies and hindered development. A certain instinct of willing subordination is an advantage in a nation, and at the same time a defect in an individual; and perhaps it is this power of the individual which in Italy has closed the avenue to development.”

And of the physical traits of their descendants he gives four

ITALIAN TYPES.

“First, there is the pretty and delicately-carved head, perfectly regular and *spirituelle*, with a lively alert air, betokening a capacity to comprehend readily, and to inspire love as well as to express it. There is also the square head, planted on a solid trunk, with large sensual lips and an expression of coarse

gaiety, either grotesque or satanic. There is the lean, dark, sunburnt animal, whose face has no longer any flesh upon it, wholly consisting of strong features of an incredible expression, with flaming eyes and crisp hair, similar to a volcano about to explode. There is, finally, the handsome and stout man, vigorously built, and muscular without clumsiness, of a rich glowing complexion, who regards you calmly and fixedly; powerful and complete, who seems to await action and self-expansion, but who, in waiting, is not prodigal of himself, but remains passive."

THE FRANCO-CELTS.

"A race brave, quick to quarrel, vain, and fond of display, with little pertinacity, but capable of extraordinary efforts; liable to excessive discouragement and unreasonable elation; never attached, like the Teuton, to the soil, but preferring the associated life of large towns; intelligent and apt, but seeking wealth by plunder rather than by slow gains. A people who fill the history of the past with the glory of their conquests, but who found no permanent state, and who are never willing to submit long to their own constituted authorities.

"The stock of the French people is probably Celtic, while on this have been grafted Roman and Teutonic growths, until it is difficult to say which race prevails. In character and genius the French show the evidences of all three of the powerful races who have constituted the nation, traits which sometimes seem contradictory, and which only those closely familiar with the French people can understand. In their brilliant martial character, their love of display and *effect*, their sudden enthusiasm and as easy discouragement, their readiness to be ruled by military leaders, their fondness for ornament and art, their gaiety, fickleness, and amorousness, they are thorough Celts, such as their ancestors have been in all ages; but in the sober devotedness of a large mass of the people, in their seriousness, in their personal sensitiveness and personal independence, in the spirit of their sceptical inquiry and the

thoroughness of their scientific research, they are Teutonic ; while their wonderful talent for organisation and their tendency to centralisation are Roman. Still, with all this, and much more which might ingeniously be worked out of inherited qualities, one feels that we no more describe the great French nation than a man of genius is described by picturing his forefathers. The French race, with its genius, its science, its grandeur, its faults—which are the scorn of mankind—its misfortunes—which afflict the world—its magnificent past, its uncertain present and mysterious future, is a unity, a new and living force entering into the life of mankind, and henceforth as distinct as any of the great races of history.” *

THE TEUTONS.

“ They are pictured as a tall powerful race with light hair, blue eyes, and a clear blonde complexion ; their hands and feet were small. The especial mark of high rank was the brightness of the eye ; and long hair was considered a beauty.

“ They were a race remarkable for personal dignity, which easily became corrupted into excessive pride, and for a boundless spirit of individual enterprise. With these traits they united a simplicity and trustfulness, which were observed by strangers. They were notoriously reckless of their own lives, and cruel to enemies ; fond of adventure, especially the sea, preferring whatever involved peril and hardship ; greedy for booty, and given to the pleasure of the table and gaming.

“ The Teutonic character was arbitrary, and therefore delighted in slavery and difference of classes. In distinction from the Celts’ love for cities, the Teuton preferred life on ‘ farms,’ each landholder calling his farm his court, and even carrying his independence so far as to fortify his property.

“ The Teutonic mind was moral rather than religious.

“ The old Teutonic character is well preserved in their English and American descendants. The boundless spirit of in-

* Brace, “ Races of the Old World.”

dividual enterprise, the personal pride of perils of the sea, shrewdness in technical law, fondness for ardent spirits and for drunkenness, the respect for woman, the immeasurable contempt and prejudice against inferior races—English for Irish, Yankees toward Negroes—are an unfortunate but legitimate inheritance from Teutonic ancestors.” *

RACES OF TO-DAY—NATIONAL PSYCHOLOGY.

From these historic and rather general views, let us now look practically at the three leading nations of the world in the actual present, and see if we can arrive at conclusions which will be of utility to us in our study of life.

These three nations are France, Germany, and England.

Look at a map of the world, it is this small spot in the north of Europe which, intellectually speaking, is the centre of the terrestrial system; and Paris, and London, and Berlin are the threefold sun from whence the light of science and art proceeds. The scattered human race may be regarded as a sort of vast living creature of which at present this threefold centre is the brain or soul.

Remember this, O patriotic young American, when you take your bridal tour. Mammoth Cave is unquestionably the greatest curiosity in the world, and the Yo Semite Valley the next greatest, but satisfied curiosity is not intellectual and moral benefit; to receive this in its fulness you must go to the source.

You would be ashamed to visit the Alps and the Rhine before you knew your own country? Very well, leave out the Alps and the Rhine. Natural scenery is the world's footstool—it is even less; you do not enjoy the fragrance of the rose by smelling of the earth around its roots. Let us turn our attention, then, to the flower itself.

England, France, and Germany present respectively the predominance of the qualities of muscle and heart and brain,

* Brace, “Races of the Old World.”

or, to put it in mental phrase, the will, the emotions, and the intellect.

The English race have through a long course of years, by the nature of their lands and climate, and by other surroundings, been forced to the excessive cultivation of the muscular or active portion of the man. The stern tyrannic thought, the one great trait of English character, is *energy*. You see it in their industry, in their commerce; the cotton-factory and the steamship are English institutions. You see it in their fondness for athletic sports, their respect for the powerful and contempt for the weak. You see it in the British idea of manliness; the reign of muscle, the reign of force. [They have a diet of cheese and roast-beef.]

The nature of a Frenchman is a nature acquired by centuries of unrestrained emotion; a worship of the beautiful, and the tender, and the true, just spiced with a bit of the lower passions; a race of artists and lovers. [Living upon a diet of coffee, wine, and spiced gravy.]

The German is neither sentimental nor active: he is absorbed in thought; he has a big square forehead crammed with ideas, and he wears spectacles; he is a maker of dictionaries and philosophical systems, and never-ending volumes of dry-as-dust science. He calls the Englishman a materialist, and the Frenchman a spoilt child. [The German doesn't care a particle what he eats.]

In a word, this German doctor *knows* everything; the Parisian, who is half or all artist, *feels* everything; and the Saxon *drives* everything.

When you go to London, let your first, second, and third thought be to show your manliness. If a man calls you an unpleasant name, get in your right in his teeth and your left in under his ear, and then ask him if he wants any more; you will show by this that you have the birth and breeding of a "gentleman."*

* See "Terrible Temptation," "Tom Brown at Oxford," &c.

Across the Channel, on the contrary, conduct yourself precisely as you do in the presence of woman. Be kind and gentle, act as though you were happy and wished others to be so, feed the little birds in the parks, praise the children, and speak reverently of painting and the theatre.

In Germany you can do as you like. It is the only country in the world where there is mental freedom, and where eccentricity and individuality are not ridiculed and frowned out of existence. It is not there looked upon as folly or pedantry to be able to speak seven languages; and if you are caught in a railway car with a Greek poem or a work of biology in your hand instead of the newspaper or a novel, you need feel no shame, you will not provoke a compassionate smile or mutual winkings between your two companions.

What shall I say, finally, of the new race over the sea?

AMERICANS,

the transplanted variety of the Teutonic stock, too, have already acquired a distinctive character of their own. Here is the way a late conservative gentleman of the old school talks of the matter, addressing them like a father or a friend doubtless, for he tells them chiefly of their faults:—

“‘FESTINA LENTE.’

“‘I’d ha’ you sober and contain yourself,

Not that your sail be bigger than your boat.’

Every Man in his Humour.

“There is probably no country in the world in which the fundamental laws laid down by nature for man’s guidance are so wilfully and persistently violated as in these United States of America, and it is to this fact that we are led to attribute the most serious defects of American character.

“The old world stands aghast at the enormous strides of a mere infant among nations, which, in less than a century, has peopled a broad continent, and taken root in the very foundation of civilisation, whose vast internal improvements have

literally made 'the desert to bloom as the rose,' and whose commerce stretches forth its arms to the far eorners of the earth, but the individual character of the average American has neither excited the admiration nor commanded the respect to which the wonderful achievements of the nation would seem to entitle it.

" 'Americanism,' upon the contrary, is considered the synonym for all that is pretentious, unscrupulous, and superficial; and whether correct or incorrect, there can be but little doubt that the tendency of our education and habits is not only to verify this estimate, but to produce other results equally deplorable.

" 'We are educated to believe that each of us is to attain rapid suecess as the great ultimatum to which all other considerations are to be sacrificed, that we have no right to enjoy life, to breathe, to love, or to dream, save with a view to its more speedy attainment; and by the practice of our lives we demonstrate the success, we seek to be measured only by speculations upon all that human power and human intellect strained to the utmost throughout eternity could achieve. The American boy is held at school like a hound in the leash. It never occurs to him, and it is rarely suggested, that life, health, and intellect are given for any purpose than to be used and exhausted in the accumulation of money and the attainment of celebrity; the *rationale* of their enjoyment is an unknown quantity, the equation of which he is not taught. It is true that in youth, before the promptings of nature are subjected to the iron rule of will and habit, he enjoys in spite of himself, under protest as it were; but even then he is the oldest boy that the world ever saw, and before he is out of his teens, with beardless face, he not unfrequently becomes an old man. When he leaves school the business of life begins in earnest. He buckles on the harness of the world, and from that moment, save when at first nature rebels, air, earth, and sky, and all forms and conceptions of loveliness, are 'sicklied o'er' with

the leaden hue of calculation—from that moment, with the national slogans ‘hurry up’ and ‘look sharp’ in his mouth, he calls into action every faculty which he possesses to assist him in the tremendous pace of a life which is terminated only by the inevitable catastrophe, with which the Nature he has outraged avenges her injuries.

“In this high-pressure existence there seems to be two courses, which, like Scylla and Charybdis, are equally certain destruction, and which bear the same relation to each other that the journey of the traveller who climbs steep hills and wades through morasses to reach a given point, bears to that of him who adopts the more perilous but shorter route over slender bridges and yawning chasms. The one is the hard, pitiless routine, the constant, unrelenting tension of brain and bone which slowly and surely, atom by atom, and brick by brick, builds up the enormous fabric of individual fortune and power; the other the tumultuous excitement of speculation, the succession of frantic efforts by which the legitimate results of a lifetime of labour are won or lost upon the hazard of a die. Between these two courses there is little choice for the individual, though the latter is probably more disastrous in its effects.

“The one individual will usually succeed in accomplishing something besides his own destruction; the other destroys himself, and leaves ruin behind him. The lives of both are barren of enjoyment and sterile of beauty.”

Doubtless there is much truth in the charges which this unamiable old gentleman makes against the young nation which he sees before him. To those “giant strides” which the infant makes it pleads guilty; as the lamented Ward would have it, it’s a way the infant has. “On the western coast of the Atlantic the dry atmosphere and sudden changes of temperature, and a surplus electricity, create in the people a *restless and exaggerated activity*.” A newly-landed European strolling up Broadway is impressed with the idea that every-

body he sees is *running after something*. This is the key to all the Yankee's short-comings ; they are a fast people, and they are always in pursuit of something. If an American is not married and settled, and in a way to make a fortune at the age of twenty-five, he feels as though his was a ruined life.

I do not think it is the air or climate chiefly which produces this state of things ; it is due rather to that surplus activity which everywhere accompanies growth, but directed by certain well-marked feelings, the feelings that a brilliant but unknown youth might have when competing for a prize with several noted and substantial, but in his estimation stolid and less-gifted men of mature age ; and he proposes to put himself in one year through a course of training which will enable him to stand above these competitors, who have been forty years at the work.

That the "unscrupulousness" and "conceit" of which they are so often accused is anything more than a passing phase, the wild oats of youth, I will not for an instant believe. The great quality which is peculiarly their own, and which being something new under the sun excites derision, is the faculty or feeling which psychologists call *plot interest*, or *pursuit*. The feeling of the hound on the course, of the racer when nearing the stake—the *pursuit of an end*. All their education and their surroundings are such that a bright boy of the rising generation feels that the first great thing is to have an end in life—a fortune, a position, something to win ; and the next thing is to win it—to win it or die in the attempt. And the passion is so powerful that the terrible alternative in the shape of disease or crime oftentimes occurs.

This emotion, as the basis of a national character, is a new one—perhaps it is the greatest ever known. Americans are laughed at for eating their dinners in ten minutes, and for running down Broadway "after something" at the rate of ten miles per hour. Wait a century—let those laugh who win.

HISTORY OF CIVILISATION.

THE PHILOSOPHY OF HISTORY.

One of the methods in the study of society, this most interesting and most perplexing of scientific subjects, is known as the comparative. By this method any, or all societies may be compared together with the view of ascertaining which is the superior, and the causes of such superiority. Greeks, Fejeeans, Chinese, and Germans. This method, the common one with Americans, is good, provided that the conditions of soil, and time, and blood are carefully considered; but these they often neglect to take into account. Many of their political philosophers seem to think that it would only be necessary to plant the American Constitution and Declaration of Independence in any land—among the savages of Ethiopia—in order to transform the inhabitants into a humane, christian, and self-regulated people like themselves. Such philosophers ignore first the property of race. “The mysterious and far-reaching property of blood—of race—is becoming more and recognised in science. That power whereby the most distant ancestor shall influence his remotest descendant, and, still more wonderful, that accumulated effect of a line of ancestors on the final progeny, so that a clear stream of inherited physical and mental peculiarities can flow unmingled through human history in every variety of external circumstances and external influences, is something not to be too lightly weighed in the philosophy of man or his history.” And further, the element of time. A long course of despotic training is necessary before a people are capable of self-government. We forget the thousands of years that we were held in the iron grasp of barbarian Saxon chiefs, and the centuries passed under the tyrannic heel of Henries, and Edwards, and Elizabeths, in order to create in us those rare faculties of conscience and self-control which are our bulwarks of liberty.

The second method is the historic, or tracing the course of civilisation in order to learn what direction it has taken—wisdom by experience—the lesson that history teaches us. We have but little material to work on, it is true, a little strip of land around the Mediterranean sea, and what lies between this sea and the Atlantic.

The mountains of Tunis and the Plateau of Asia Minor, the highlands of Greece and Italy, and the valleys of the Seine and the Thames, the swamps of Holland and the Germanic plain.

The cities of the Memphis, and Jerusalem, and Carthage ; of Athens, Rome, and Marseilles ; Florence and Venice ; Paris, Berlin, and London.

This is all—the historian's world. Over this small tract, in a diagonal north-westerly direction, the current has passed. The Pyramids are the beginning, and the iron docks of London are the end, of the story, the world's course, as we call it—meaning by world, the half dozen races of men who have inhabited this miniature territory. And the “course” is pictured as a stream which, ever flowing onward, assumes, at different distances, peculiar colour. It is thus divided into an antiquity, a dark age, and a renaissance. A dark age, when the light was nearly extinguished from “the world ;” a grand awakening, when “the world” shook of its fetters, &c., &c. Such divisions are arbitrary and superficial ; these half dozen races should not be consolidated into a world or a humanity, and civilisation figured as a long stream which now runs clear and now muddy. These races of Europe, on the contrary, should be pictured as so many trees, which successively blossom. Thus, when you contemplate successively the epics of Homer and Virgil, and then those of Dante, and Milton, and Pollock, you are not sailing down a stream, you are jumping from one shrub to another.

In this view we get a different division of historic time ; we may name the ages as we have named the great geologic

ages, giving each the name of the organism which then predominated.

Thus, the two thousand years B.C. would be called the Egyptian age; the succeeding one, the Greco-Roman. Instead of the dark ages we have the Arabian. The sixteenth century is emphatically an Italian age, for during that period this people gave a tone to all Europe; while the seventeenth and first half of the eighteenth—the age of the grand Louis and of Voltaire—is most thoroughly French. The following seventy-five years bear no less clearly the impress of the Germanic spirit. At all events, each society and each nation must stand by itself. A state of society is a flower born by its own peculiar plant, and by no means a link of a chain. Our career of “humanity,” therefore, becomes instead, a Semitic, a Latin, and a Germanic career.

Having thus isolated the races, we may study each by itself. The drift of such a study has already been given in the outline sketches of national character. The peculiarities and differences are thus plainly brought to light. Another and more important step remains—namely, a comparison, not as regards distinctions, but with a view to find out similarities, and to discover, if possible, the general law which governs all national development.

Such a law has been discovered. It is found that *societies* of men, no less than *individual* men, pass through certain phases or stages before arriving at maturity. A man passes the age of infancy, and boyhood, and youth—each age characterised by its own peculiar ideas and feelings. A nation passes through analagous transition-stages. Three of these are determined. They are called by philosophers anthropomorphic, metaphysical, and positive. I will note briefly the threefold aspects—intellectual, emotional, and material or active of each.

In the early history of every people, the idea of the laws or course of nature is fashioned after a human mould, in a

peculiarly human fashion. When it thunders, it is because Jupiter is angry ; does a plague break out in a city, a god is punishing man for shortcoming (the modern version of this idea is well expressed in a speech of Napoleon III., just before the late war), "Remember," said he, "that God ever protects France."

Next, as regards feeling ; the great passion of the early age is the religious or theologic, a passion composed of love united to wonder and fear.* It is the age of altars and sacrifices, of prayer said at the street corners, and during the day at each instant that any desire, even the most trivial, occurs to the mind ; and here appear the pomps of the church and the priesthood. The Old Testament, the poems of Homer, and the legends of the dark ages are most instructive in relation to this state.

On the material side, we have hatred of mankind at large, and almost constant war. Every man is a soldier ; hence this is often called the warlike or military stage.

As time wears on, and the childish nation grows in size and experience, these ideas and feelings become obsolete, and others take their place. Thunder is no longer the growling of an angry god, but it is due to a mysterious and beautiful principle in the clouds—a thunderosity residing there. Life is caused by a sort of mysterious witchery, called a vital principle ; some mystery is invented to account for everything.†

The sentiment of the day is no longer religion ; the tender emotion which throughout persists, and by its union with others, forms the ruling passion, is here combined with feelings of fitness, unity, harmony. It is the æsthetic period, the golden age—painting, sculpture, or poetry flourish. To live elegantly is the end of life.

* Bain.

† "Mettez le doigt dans le nez quand je joue, ça me porte bonheur," said a player at Baden-Baden to one of the spectators. "There's luck in odd numbers." "Friday is an unlucky day." These are metaphysical relics.

In the succeeding stage, love is transferred from the beautiful to the human. Morality succeeds beauty, as beauty succeeded theism. If you had asked a man in the days of the Crusades the highest passion of which the human soul is capable, he would have answered you by rolling the eyes heavenward. A great artist, three centuries later, remarked that he had four hundred ways of making the eyes roll heavenward. If you had asked *him*, What was the grand desideratum in life? he would have said, Monsieur, *c'est l'élégance*. Finally, what to-day is the sublimest passion of the human mind? It is love for his fellow-man.

The activity of this latter age is industrial; the idea or philosophy is scientific—a world governed by laws, of which the attraction of gravitation is the type; all knowledge relative, and gained only by experience. Facts only, and not abstractions, are regarded as causes.

“There is an inherent tendency in the mind of man to ascribe to supernatural agencies those events the cause of which are beyond his knowledge. But as his intellect becomes more thoroughly trained, and as science advances in its developments, the range of his credulity becomes more and more circumscribed, his doubts are multiplied, and he at length reaches that condition of healthy scepticism which allows of no belief without the proof. Thus he does not now credit the existence of an *archæus* dwelling in the stomach and presiding over its functions, for he knows by experiment that digestion is a purely physical process, which can be as well performed in a tea-cup with a little pepsine and dilute chlorhydric acid as in the stomach with the gastric juice; he does not now believe that the bodies of lunatics, epileptics, and hysterical persons, are inhabited by devils and demons” (and I may add, spirits), “for he has ascertained by observation, that the abnormal conditions present in such persons can be accounted for by the material derangements of the functions

of the system. He has learned to doubt and hence to reason better."—*Hammond*.

The progress or development of a society, then, is the passage—intellectually, from the anthropomorphic or human conception of nature to the scientific conception, from the idea of caprice to that of law; emotionally, from the theistic passion (worship of force) to the moral or philanthropic; materially, from the military to the industrial state.

It would seem that the well-known ages or periods of development in the individual man are closely analogous to these stages in the race. How close the analogy may be drawn, it is not safe to say. From the newly-discovered law that the *career of the individual is an epitome of the career of the race*, it follows that every man of us must, somewhere before arriving at maturity, pass through these phases of idea and feeling.

Gravely modified as such phases must be by education, obliterated as they must be by time, condensed as they must be, a thousand years' lives in one. Perhaps it will be useless to attempt to discover a correspondence. There are certain writers, however, who declare that such a correspondence exists and is exact; that the ages of boyhood, youth, and maturity are, in fact, repetitions on a small scale of the theological, artistic, and scientific or moral stages of the race. If this should be proved it will be important. The crusades will assume a new interest in our eyes if they are considered as the undertaking of men having feelings and ideas half-grown—the crusaders being boys of adult stature. The distorted but elegant lives of the gay courtiers of Louis will prove doubly interesting when regarded as those of fast young men not yet out of their teens. It must be understood, however, that all such surmises are speculation, not science. The scheme here laid down is doubtless too narrow.

It will not do to draw the lines of definition and distinction

too closely. Instead of seeing here a great universal law of social development, we ought, perhaps, only to note and define this progress as the *special tendencies* of modern European nations during the four centuries past. As a final and safe conclusion, if we take on the one hand the writings of Dante and of Machiavelli as the best embodiment of the thought and feeling of an early time, and those of Goethe, Balzac, and of John Stuart Mill, as the fullest expression of the present, we shall not fail to realise that there has been a great change—that times truly are “not as they used to be.” We shall feel this gradual change in popular sentiment from the religious towards the moral, in popular opinion from a belief in the supernatural to a belief only in the positive and real, and in aims and pursuits from those of arms and of war to those of mechanics and of industry.

THE JUVENILE STATE.

No analogy which nature offers us is so instructive to the student as that between animals and plants. Children of the same parents, and beginning life both together, these creatures have reached maturity by widely different roads. Different courses of life, persisted in through long periods, have caused the widest divergence of character possible. The societies and civilisation of the one appear at first glance to be as much unlike the society and civilisation of the other as can well be imagined. On the one hand, we have that vast and wonderful aggregation of beings called a tree, on the other, the still more wonderful collection of individuals which we call a state, or nation.

The more careful studies of nature during the present century have revealed to us this new and strange relationship of the one wonder to the other ; a great discovery is made by the human mind, a great discovery like that of language or that of fire, and the wave of progress receives a new impulse. We have learned that the whole world is kin ; the plant is our

fellow-creature and our brother, born of the same mother earth ; side by side with us it has lived through the hundred million years of our adolescent growth, eaten the same food, breathed the same air, fought the same stern battles for existence, and rejoiced in the same glorious sunshine.

The world is kin ! A new revelation and a new inspiration is given to man in that thought.

The world is kin ! flower, insect, beast, and man—in all our veins there flows the identical life blood, in all our nerves the same electric current.

The world grows humbler as it grows wiser. Little thought our forefathers, with their psychological puzzles, that from the lowly animals whom they despised and called machines, should come the solution—little thought they, with their “contract social” and their “ideal states,” that the science of politics was to be learned by the study of vegetables. Let us apply the new method.

Take one of the great floating oceanic weeds as a first example. It is composed of a thousand spongy stalks, all just alike ; there is neither root or breathing organs anywhere in the community.

Compare with it a shrub from the mountain side. Here is a community of classes ; a hundred of its members are brown roots and imbibe nourishment, another hundred bear the leaves, and a third class are clothed in gay colours and perform reproductive functions for the entire state.

The one of these plant colonies is in the stage of savagery, the other in a stage of civilisation. Society is a collection of individuals among whom there is a division of labour.

An African village is like the floating seaweed ; all of its members have the same dress and the same appearance ; every one lives the same life and has the same selfish duties.

In the fertile valley of the River Nile many years ago, shut out from the rest of the world, there existed such a weedy sort of colony, which, under the favourable conditions

there afforded, slowly developed into a beautiful flowering shrub. If, now, you could have looked down upon that valley and have observed the great Egyptian plant in its splendour, you would have marvelled at the metamorphosis and divergence which its stalks had undergone. Many of these now resembled white roses, with their long priestly robes; others were bristling with thorns—the soldier classes, with spear and glittering armour; others were like brown roots, dull-coloured, gnarled, overworked, and earth-crushed. The spotless priest, the glittering soldier king, these are the diverse twigs—the root, leaf, and flower of the human tree in its infancy. The Nile valley brought forth the first example, and the banks of the Indus and the shores of the Mediterranean and of the Atlantic quickly followed when the human seed was sown.

What are the conditions necessary in order that this division of labour which constitutes civilisation may take place?

Many causes combine to produce the result; doubtless, climate and soil are especially to be considered, but the main-spring is that of all development—competition. When population increases to an extent that immigration is difficult or no longer possible, masses of men will be crowded more closely together, and gradually among such a mass in which a certain amount of action or labour is necessary, there will be certain individuals who will become addicted to a one certain portion of the routine, leaving other portions to be performed by other individuals. Generally speaking, the life of a family or tribe of savages consists of two things, fighting and procuring food. And here arises the first grand social division, the soldier and the labourer.

These distinctions once set up, as time wears on, are carried to great extremes; the two men which in the beginning were brothers, in a few hundred years become in the social eye, the one to be the descendant of gods—the God-king, and the other the vilest of slaves. To supply another social demand

also there arises finally another profession and class. The savage mind, like the child's mind, is eternally and supernaturally inquisitive. It must have a papa continually on hand to answer its questions, and the papa, long-robed and infallible, is forthcoming. Some one in the community will be sharp enough to see the demand, and supply it at a good round price. Thus society begins, and once begun, its further development is easy; a race thus organised, possesses over other races the advantage which a well-disciplined army has over a mob, and the favoured one levies a tax on the rest of the world. Secondly, these social divisions, once begun, become the cause of fresh divisions, as by war and increase the nation grows rich and populous. The soldier class is divided into the legislature and the army, the working-classes into labourers and merchants. Few, however, are the nations which reach the proud maturity of which our own boasts. The dangers to which a young civilisation is exposed are countless; as over one half of all the human beings born never reach the age of seventeen, so of the societies, only in a far larger proportion. Few pass beyond their teens—few pass beyond the stage of the priest and king. Egypt, the first, affords us perhaps the best example of the juvenile career of a state. The picture of the Nile civilisation and society is one of the most fascinating and one of the most instructive in the world. Where the lofty plateau of equatorial Africa sinks towards the north in a vast concave depression of which the Nile occupies the lowest part, in this space of more than four hundred and fifty miles in length by a breadth of nearly twenty, with the brilliant glow of the sky, the freshness of the waters, the fertility of the plain, and the aridity of its borders, there grew the first human flower.

“The shape of this valley was peculiarly adapted to protect the nascent civilisation against native barbarism—well adapted for the initiation of its savage men into the peaceful mysteries of agriculture and industry. The isolation of this portion of

the basin in which it dwelt, constituted the strong point of Egyptian society during its period of development. With few exceptions the migrations of tribes and races that then wandered to the four quarters of the earth swept past either above or below it.

The population of the valley of the Nile is dimly seen attempting a form of civilisation, of which historians make known to us only the decline; the great mass is subdivided into groups of it, held together by common bonds. Sedentary life, industrial and agricultural habits, derived, like social manners and customs, from the imperious exigencies of their dwelling-place, and the odd shape of its narrow and elongated territorial surface.

What was then wanting to the tribes who inhabited the banks of the Nile at this period of their existence to form a nation? Catastrophes, which bring communities closer together and combine them as they do individuals, a partnership of perils, struggles, sufferings, reverses, and triumphs gone through side by side. Such are foreign invasions. External enemies completed for Egypt what internal competition had begun, and the nation became a reality."

From that excellent little book "Egypt 3300 Years Ago" I have taken the following extracts illustrative of the first of Human Societies:—

THE GREAT RAMESES SESOSTRIS.

THE CORONATION.—"A throne of ivory, the base of which represented in gilded relief the sphinx, the emblem of wisdom united with strength, and the lion, the symbol of courage. Of this throne the coloured statues, the goddess of justice and the sun god of truth with outstretched arms and expanded wings, formed the background and sustained the dais. The king having seated himself in this shrine, twelve warrior-chiefains, the first in the empire in dignity and birth, uplifted

him upon their shoulders. Other great personages then took hold of some particular part of the support, and all moved off together, preceded by an immense crowd to the temple of the sun. The march was opened by a band of vocal and instrumental music, in which figured the rudimentary types of the flute, trumpet, and drum. The brazen gates gave passage to a long succession of priestly choirs advancing to the presence of their god. Minor gods they brought with them on their shoulders, and small tabernacles carefully veiled with thick tissues of silver and gold. The tabernacles of the gods were followed by statuettes of the royal ancestors and predecessors of the king (from the sun downwards), also carried and interpreted by the priests. Then in the midst of another sacerdotal group, the white bull, the living emblem of the great god himself, covered with flowers and enveloped in a cloud of incense, appeared on the threshold of the temple.

“On the arrival of the procession, the high-priest presiding over the pageant, with all the pontiffs officiating under him, received the king, who, ascending to a place beside him, aided in completing the sacrifice ordained for the occasion, poured out the consecrated wine before the god, burned the prescribed incense amid a shower of flowers, and prostrated himself while pronouncing these words so arrogant yet simple: ‘I come to my father, god, the sun, at the end of the procession of gods which he forever admits to his presence.’

“During this time these same gods and their terrestrial retinue wheeled solemnly round the altar, mingling with the homage that they laid at the feet of the King of Heaven as they passed, the wishes which they expressed for the welfare of the new king of the earth.”

The name of the king, with his titles was as follows: “The God Sun, the Mighty Bull, Loving Justice; the Supreme King, who himself directs his soldiers; the Sword of Terror; the Rampart of his army on the day of battle; the King of Upper and Lower Egypt, with the mighty courage and the

boundless ardour; the Sun, Lord of Justice, the Chosen One of the God Rhra, the Son of the Sun, Rameses."

Extracts from the Sallier Papyrus.

THE PRAYER OF THE KING ON GOING TO BATTLE.

"What, then, is the intent of my father Ammon? Is it a father who would deny his son, or have I trusted to my own thoughts? Have I not walked according to thy word? Has not thy mouth guided my going forth? . . . Have I not dedicated to thee magnificent festivals in great numbers, and have I not filled thy house with my booty? I have sacrificed to thee thirty thousand oxen, with all the scent-bearing herbs and choicest perfumes. I have built for thee upon the sand temples of blocks of stone, and bringing obelisks, I have reared eternal shafts in thy honour. . . . O sun! have I not obeyed the order of thy lips? have I not given glory to thee to the ends of the earth?"

And the sun replied, "Rejoice and be glad; he flies to thee, he flies to thee. . . . Behold I am near thee; I am thy father, the sun; my hand is with thee, and I am more for thee than millions of men arrayed together," &c.

THE MONUMENTS OF RAMESSES.

"It was above all in the two great capitals of his empire, Memphis and Thebes, that the monumental splendour of Rameses struck the observer of antiquity.

"What must not Thebes have been at the period when her temple palaces, built and embellished by twelve generations of god-kings, rivalled each other in splendour and display; had for enclosures fresh thickets of palms and mimosas, and mirrored in the blue waters of spacious basins of marble and porphyry; when amid floods of light, under the rays of an unrivalled sun, there sparkled to the gaze the vividly coloured bas-reliefs of the granite pillars, the inscriptions on rose-tinted

obelisks, the giant heads of sphinxes and colossal statues, and where each Egyptian could contemplate in the one the grand prayer of his country's history, and in the other, revere the well-known features of his ancestors, the gods and heroes of his race!"

In the temple, between the court and the sanctuary of the gods, was a spacious hall, with numerous columns and massive ceiling; one of these, three hundred feet in length, has its hundred and thirty-four columns seventy feet in height, still standing.

"In the shadow of these groves of columns, where apertures, curiously cut in the upper part of the cornice allowed just enough light to enter to illuminate the reliefs and tintings of the numerous scenes upon the pillars and upon the walls, the monarch, seated on a gorgeous throne, between the mementoes of his ancestors and the images of the gods, presided at the meeting of the priesthood and warriors, the high dignitaries of state."

And the scribes, educated by the priests, took down minutes, and they were recapitulated upon monumental pillars which have come down to us. Here is the beginning of one of these curious records.

"When he had subdued the land of Ethiopia, trodden the Libyans under his sandals, and rooted his sceptre among them, after terror had overwhelmed other hostile races, the living and life-bestowing god, the representative of Ammon the king-sun, director and defender of our land, the child of the gods, the beloved one of the sun, the eternal life-giver, descended at Memphis to accomplish toward the divine triad of that city the ceremony of thanksgiving.

"Sixteen halls carved out in the flanks of the mountain, by the chisels of the old Egyptian sculptors, are dedicated only to reproduce his deeds, and to glorify the memory of this god-king. Upon their walls he battles and triumphs as a warrior, sits enthroned and wields the sceptre, and officiates as pontiff.

His statues erect, sixty feet in height, with their arms crossed upon their breasts, supply the place of pillars to prop up the mountain. There he sits, between Ammon, the supreme divinity, and Phrah, the sun made a deity, and for thousands of years this triad receives the incense of worshippers.

“The sceptre of Egypt was wrested from the hands of kings and placed in that of priests, under the Anathema which fell upon her military and warlike energy. Egypt sank back upon herself, like her granite sphinxes, crouching near the entrance of her temples. Thenceforth concentrating in the adoration of natural phenomena an activity which had no other outlet, she strove to connect with the subtleties of nascent metaphysical science the rude conceptions of her original mythology, and made everything else subservient to this vain toil—men and things, principles and facts, art, industry, and intelligence alike. With her, everything passed into the condition of a symbol, and every symbol became stone, until, petrified herself, like the objects of her idolatry, she did not notice the billows of the human race that were flooding up around her.”

THE PEOPLE.

“If it were asked what the condition of the *people* was in this nation—those who make up the levying force of a nation—we should have to reply that the *people* did not exist in the days of Rameses; and that their rise had not yet dawned upon any human community.

“King and priest, the priesthood and the army, below them two classes, one of which was the conquering and the other the educating caste; in the valley of the Nile there were crowds of artisans, of workers by hand, who, under the direction of the chiefs belonging to the religious castes, cut and built masonry, melted and worked with the metals, and spun flax, in fact, toiled at the trades assigned to them from the cradle by law or descent. There were farmers who tilled the lands given to them by the king, the priests, or the warriors,

who were the sole owners of the soil of the empire. Upon the borders of the deserts, around the oases and the broad levels of the delta, lived herdsmen, who transmitted from father to son the business of raising and guarding the flocks and herds of the royal, ecclesiastical, or military domains. But these shepherds, these labourers, these artisans, excluded by law from public affairs, deprived also of the right to bear arms, and of plying the various trades at once, liable to be condemned for each offence to imprisonment, fines, or the bastinado—that great resource of the stationary East—could not be looked upon as citizens by modern eyes. Indeed, they do not appear to have differed much from the Sudras of India to-day, to whom the sovereign master of things has assigned but one office—viz., that of serving the upper classes without depreciating their merits.

“Below them, again, were the slaves who had been purchased in the markets or captured in war. The fate of the slave was almost too shocking to repeat; a papyrus of the time tells us that they were ordered to make brick without *rest or cessation*. This working up of the captive and the slave pushed to its utmost limits, *i.e.*, mutilation and death, was the *law of nations* of a historic age which did not cease until the beginning of modern times.

“Civilisation could not sustain itself at the outset and go on with its development, except under the shelter of a rigorous system. There must be a coercive principle, material as well as moral, to compel wandering tribes, whether rude shepherds or savage hunters, to become a nation. The institutions of Egypt promptly attained this end—the type of absolute monarchy in which the despot could be, up to a certain point, less the tyrant than the father of his subjects; wherein each class and each profession had its allotted sphere; wherein a religious dedication to the task extending its influence from father to son, age after age, confined each individual within a circle of cares and duties, amid which he was to live and die;

wherein, finally, at the cost of beholding all human dignities concentrated on a few heads, and the free will of each sacrificed to the rigid mechanism of the law, the arts of peace, agricultural abundance, and commercial wealth seemed to diffuse themselves over the whole social body at the hands of the sovereign, like the blessings that traditionally descended from divinity itself.

"The dwellings of the poor were subjected to the same law that proclaimed *the monarch the son of God*, and made the priesthood his inspired interpreters. Around consecrated edifices of imperishable material, cemented with the blood and sweat of whole generations of slaves, were grouped at intervals the neither very grand nor very lasting structures of the principal functionaries of the empire, the brick-built workshops, and the cabin of the fellah made of clay and reeds, and the mud hovel of the sable captive, who, crouching on the dungheaps of the animals entrusted to his care, vainly strove to dress his bleeding cuts which the stick of the master had inflicted upon his naked body.

"Babylon and Nineveh, the primitive cities in the basin of the Oxus, Indus, and Ganges, at a later period the cities of the Etruscans in the west, much later still those which the Toltecs and Aymaras built upon the table-lands of the Andes, the Indian emigrants in the forests of Hindoostan, all the metropolitan works, in fine, which were erected during the passage from the second to the third social epoch, were constructed upon this principle."

The other three branches of the African family-tree have much in common with the old Egyptian stock. The cities of Nineveh and Babylon, which shortly after grew up, most nearly resembled the parent; there were the same classes—the slave and the god-king and the priesthood. Great temples and sphynxes were carved out of the rock, and made to celebrate the fame of the conqueror.

Other tribes wandered southward, and were scattered over

the broad plateau of Arabia, whose arid sands offered but poor soil for the evolution of a highly-developed product; there was rather degeneration for a number of centuries, until late in the middle ages, "when dark night reigned over the European world," Arabia shone forth, for a short period, almost the only star, but quickly to be extinguished by new-rising light. In the appearance of Mahomet we see again the *god-king*—that spring-flower of opening national life.

History gives us an account, too, of the emigrations out from the fatherland, of other tribes, who turned their steps northward. In the lives of Moses and of Aaron and their descendants, we see the same social castes; and in the Book of Exodus, the picture of the same semi-barbaric social state as that of Egypt. Later, upon the eastern and southern shores of the Mediterranean, founding the cities of Tyre and Jerusalem and Carthage, and driving their ships to every shore, we find them grown the great trading people, the most acute, perhaps, of antiquity; and for a time the highest destiny seemed to await them. In David and in Queen Dido we see almost the last of royalty. In the "son of David," the expected Messiah, the traditional God-king appears in a new guise. Other traditional and puerile class-distinctions are also blotted out; there had nearly been a true democracy among the Semites, but the growing power of the European choked it out of existence.

Over all the world we find in this age society at the same stage. We read of three thousand Babylonians crucified by Darius. We read of his other punishments—the depriving of eyes and ears—of people being buried alive for intruding on this deity's privacy—for approaching one of his concubines—for accidentally seating themselves on the throne. Xenophon tells us, as a proof of the good government of Cyrus, that it was customary to see all along the roads numbers of persons who had their feet and hands cut off, and their eyes

put out, as punishment for stealing, &c. The mutilation and scourging of prisoners is also referred to.

This sublime and divine personage had his angels and ministers of grace, nevertheless, to the number of fifteen thousand—scribes, secretaries, messengers, ushers, tasters, cup-bearers, chamberlains, musicians, wives, eunuchs, and three hundred and twenty-nine concubines.

“The feeling of the Persian toward his king, is one of which moderns can with difficulty form a conception . . . an absolute unquestioning submission, not only to the deliberate will, but to the merest caprice of the sovereign, was, by habit and education, so engrained into the nature of the people, that a contrary spirit scarcely ever manifested itself. . . . The father, whose innocent son was shot before his eyes by the king, in pure wantonness, instead of raising an indignant protest against the crime, felicitated him on the excellence of his archery. Unfortunates bastinadoed by the royal orders, declared themselves delighted because his majesty had condescended to recollect them.”—Rawlinson’s *Five Great Monarchies of the Eastern World*, vol. iii. p. 172.

The world moves—is changing, happily. We may now give to the historic scroll a turn.

THE SECOND PERIOD.

To the infant succeeds the child. We pass from Rameses to Socrates. Beyond these wretched barbaric communities, under control of a god-king, a new order arises.

To the social beginnings of the Orient succeeds *Latin civilization*. An immense power lies wrapped in the expression. What volumes of poetry rise in the mind at the words, Greece, Italy, Athens, Rome, Venice, Parthenon, Pantheon, Colosseum—those fruits of the Mediterranean flower. Homer, Aristotle, Phideas—the *Poet*, the *Philosopher*, the *Artist*! These rise upon the vision to supplant the place of the god-king, and the patriarch, with his numerous family.

A new creature is developed, called the *City*. We have talked, it is true, of Thebes and Memphis, but these were not cities, but compound villages. Calcutta, even to-day, with its million inhabitants, is yet not a city; it is practically a group of village communities. A true city is organic, a living thing; it has its head and its heart, its organs and its members.

"In ancient times," says Taine, "men regarded their city as jewel and casket; they bore with them everywhere the image of their acropolis, and its bright illuminated temples; the villages of Gaul and Germany, the whole barbaric north, seemed to them simply mire and wilderness. In their eyes a man who belonged to no city was not a man, but a kind of brute, almost a beast—a beast of prey, out of which nothing could be made but a beast of burden. The city is a unique institution, the fruit of a sovereign idea that for twelve centuries controlled all men's actions; it is the great invention by which man first emerged from a primitive state of savagery. . . . How man loved it, how devoted he was to it, and how absorbed by it, no tongue can tell. To the universe at large he was either a stranger or an enemy; he had no rights there; neither his body nor his property was safe there. If he found protection there, it was a matter of grace; he never thought of it but as a place of danger or of plunder; the inclosure of his city was his whole refuge and his fortress. Moreover, here dwelt his divinities, his Jupiter and Juno, gods inhabiting the city attached to the soil, and who, in primitive conceptions, constituted, the soil itself, with all its streams, its fruits and the firmament above. Here was his hearthstone, his ancestors reposing in their tombs, incorporated with the soil, and gathered to it by the earth, the great nurse, and whose subterranean manes in their silent bed watched over him unceasingly; it was a combination of all salutary, sacred, and beautiful things, and for him to defend, to love, and to venerate."

"Country is more than father or mother," said Socrates to

Cato, "and whatever injustice she inflicts upon us, we must submit without striving to escape from it. So did Greece and Rome comprehend life. When their philosophers, Aristotle or Plato, treat of the State, it is as a city, a compact, exclusive city, of from five to ten thousand families, in which marriage, occupations, and the like, are subordinated to the interests of the public. If to all the peculiarities we add the accurate and picturesque imagination of southern races, their aptitude at representing corporeal forms and local objects, the glowing exterior and bold relief of their city, we comprehend that such a conception of it produced in antique breasts a unique sensation, and furnished sources of emotion and devotion to which we are now strangers. . . . Life was necessarily simple. . . . A few thousands of proud, brave, temperate men, with only half a shirt and a mantle apiece, who delighted in the view of a hill with a group of beautiful temples and statues, who entertained themselves with public business, and passed their days at the gymnasium, at the forum, in the baths, and the theatre ; who washed and anointed themselves with oil, and were content with things as they stood ; such was the city of antiquity."

"Hippias, in one of Plato's dialogues, says that that which is most beautiful for a man, is to be rich, and wealthy, and honoured by the Greeks, to attain old age, to pay funeral honour to parents when they die, and himself to receive from his children a fitting and magnificent burial.

"The truest history would be that of the five or six ideas that rule in the mind of man—how an ordinary man two thousand years ago regarded death, fame, well-being, country, love, and happiness. Two ideas controlled ancient civilisation ; the first that of man, and the second that of the city. To fashion a fine animal, agile, temperate, brave, hardy, and complete, and this through physical exercise and the selection of a good stock ; and then to construct a small exclusive community, containing in its bosom all that man loved and

respected, a kind of permanent camp, with the exigencies of continual danger—these were the two ideas that gave birth to all the rest.”

THE NEW ERA.

As we turned from the study of the times of Rameses and Darius, to those of Plato and Virgil, so now we turn another page and come down to those of Huxley, John Stuart Mill, A. T. Stuart, and James Fisk, jun. As Oriental civilisation was overshadowed by Latin civilisation, so now is this in turn eclipsed by the greater Germanic civilisation. The Atlantic has at length spoken.

There is a pilgrimage for every man on earth if he only knew it. For the conservative Briton, a lover of the Bible, a worshipper of antiquity, the shrine is the great *Indian Ocean*, with its Red Sea and its Persian Gulf. For the artist, let him never put forth his creative power till he has communed with the *Mediterranean*. For the practical citizen, he may fulfil his part, having faithfully seen and felt *both sides of the Atlantic*. But, O student, avoid the *Pacific* slope as you would pestilence; to go to California is to endanger your mental equilibrium.

Life would have been intolerable in companionship with Cyrus and Moses. Even a life passed sitting upon polished marble steps, gazing at pure white statues, and feasting upon oranges, the choicest of earth's fruit, has in these latter days no charms for us. The ambition of the world runs now in a different channel. The height of your ambition and mine is not to be bastinadoed and have our children shot, by either god or king, nor yet to dream our lives away in the contemplation of beauty; it is to spend ten thousand a-year *and to earn it*. This means business.

What is your chief occupation?—Business.

What is your favourite amusement?—Business.

How do you spend your time ?—In business.

How do you occupy your leisure ?—With business.

Why do you eat so rapidly ?—Business.

Why do you not go in the country this hot weather ?—Business.

Why do you not visit Italy ?—Business.

Why have you not read “Draper’s Intellectual Development in Europe” ?—Business.

Why do you work when you are sick ?—Business.

What do you dream ?—Business.

What do you think of while you are eating, walking, talking, and sleeping ?—Business.

Who was your father ?—A self-made man. Business.

What do you intend making of your son ?—A thorough business man.

I shall again cite authority. This and preceding sections, as you have already observed, are made up largely of quotations ; these citations are worth more than anything I can say, for they are the indisputable proofs. Any one may tell a good story, but to be believed we must furnish the documents. In the geological epochs we bring forward our fossils, petrified bones, and shells, and at last as we ascend the zoologic scale and come down to the present time, we produce the living animal, beast, bird, or insect, to support our theories. Such fossils for historical epochs are the Sallier Papyrus, the Iliad of Homer—and now to-day I have before me a living embodiment of the spirit of the age, which together we will dissect. It is a thanksgiving discourse, the voice of that young nation that prides itself so much upon its possession of the most advanced civilisation—the very latest thing in civilisation.

"1. The mass of our working population, I think, were never so well clothed, so bountifully fed, and so well housed, as they are now; and the tendency is not backward, but forward. Our working population, to the very lowest stage and class, tend to more refinement in their food, more taste in their apparel, and more culture in their dwellings, year by year. In other words, the lowest material conditions are working upward, and not downward. Plainness of apparel, and of circumstances surrounding, are not signs and tokens either of civil growth or of Christianity. The general impression is, that, as nations are better, they will be economical. I think, on the contrary, they will be profuse, and have the means of being so. The impression is that they will be unadorned. I think they will be more glorious than Solomon was, in all his apparel. The impression is that the law of simplicity in the sense of littleness of having and using, characterises virtue and religion. Far from it. As you go toward the savage state, you go away from complexity, from multitudinous power, down toward simplicity; and when you come to the lowest state—to the simplicity of men that wear skins and leather apparel, and live in huts and caves—you come to the fool's ideal of prosperity. But from that low animal condition starts development, and nations go on opening their faculties; and every faculty becomes a market, and demands supply. And the more culture a man has, the more parts of his nature there are which ask for material, for institutions, for raiment, for comforts of every kind, the more there is in the single man demanding these things, the more must his circumstances open up, and become rich and potential. And in looking upon the condition of the community, if you find that they are increasing in the variety of their food, in the quality of their food, and in the excellence of cooking their food; if you find that their dwellings are growing better and better from period to period; if you find that their furniture is more beautiful, answering other ends than

merely the mechanical and physical ends—ministering to taste, ministering, if you will, to luxury—if you find these things, they are signs of upward development and of growth. These are the signs which we find all the way through our people, clear down to the bottom. And we are beginning to find them, as I knew we should, among the Freedmen themselves. For no sooner was their bondage broken than they began to feel that they were no longer animals, but men, and began, partly from imitation, and partly from that instinct which is common to all men, to gather around about themselves these evidences of growth, development, power.

“We do not think that anywhere on the globe men, on the whole, live so well as in America—or grumble so much! But that is an indispensable thing. For as men live better, their criterion of life grows with the betterment. Taste increases in a greater ratio, oftentimes, than possession; and men are dissatisfied, not so much by what they have, as by the proportion which what they have bears to their ideal. It is our ideals that make us grumblers. And so there is some comfort in that.

“The tendency, also, is to augment the conveniences, the beauty, and the resources of homes. There is universal social ambition among the labourers of America. They feel the dignity of citizenship. Power and its responsibility has produced upon them the effect that we knew it would. It has educated, it has inspired, it has developed them. And the consequence is, that they feel, not that they are a class of working men, but that they are members of society. They call themselves *citizens*. They belong to the common people. They are a part of the one great loaf; and though each one is but a crumb, unbroken, every crumb is loaf. And this, too, is a sign of growth in the right direction. Show me a man who is content with things just as they have been, when he has it in his power to make them better, and I will show you a man whose tendency is the wrong way. He is by just

so much less than a man who is contented with inferior conditions of manhood.

“There are other signs of thrift. The great fermentation and combinations everywhere pervading working men are full of promise—and vexation! They vex the present, but they will bless the future. This has nothing to do with the wisdom or the folly of any of the particular measures which the labouring men may take. All causes which come up from the bottom of society find their way up by the hardest; and mistakes are the rude nurses of ignorant men—rude, but faithful. No class and no nation ever was raised from the bottom by very much help from the top. Thus far men have scarcely discerned, and certainly have not learned, that superiority is an ordination of God, and makes the superior class the nurses and helpers of the inferior. But aristocracy has grown out of superiority, for the most part. As soon as any class has had the power to rise, it has separated itself from the lower class, and called itself cream, and desired to be skimmed off!

“And so it has been that class after class, as we go down in society, have been obliged to fight their own battle, and largely to fight it against those who should have been their helpers; and instead of succour from those who were wiser and stronger than themselves, they have had resistance.

“Now, it is not strange that when men are fighting their way up from the bottom of society, they are at first ignorant of the best modes; that they make mistakes in the instruments selected, and in the measures devised. It is not presumption against the validity and excellence of any cause that its advocates are making many mistakes. Nothing could be worse than contentment in degradation. And there is nothing, with all its mistakes, that is more auspicious than aspiration and enterprise among labouring men. Therefore, when I behold them counselling, and gathering themselves into innumerable forms of association, and learning among

themselves brotherhood, and forming habits of common thought, common purposes, and common government, whatever may be the inconveniences of the present, I regard such things as pre-eminently auspicious. They show that the labouring classes are not dead ; that they are not inert ; that they are a living mass ; and that they mean to live to some purpose, and are finding out the way to do it. My heart goes with these, my fellow-citizens, under such circumstances, even when my head does not.

“ On the whole, then, there is occasion for courage and for thanks in regard to labour, and in regard to the labourer. Labour is remunerative. The field for it is almost illimitable. Its product is wonderful. The labourers are no longer brute beasts. A change is going on perpetually. There is fermentation, there is circulation, there is emulation ; and little by little our labouring classes are coming up in intelligence, in organising power, in forecast, in refinement, in the amplitude of their domestic conditions, in all the things that go to make men happy here, and that make virtue easy and aspiration natural.

“ And it is a theme for thanksgiving to-day that, while other nations are receiving the terrible scourge ; while upon almost a whole continent labour is suspended, or works only at the forge and the foundry for purposes of destruction, throughout the length and breadth of this great land labour whistles, and sings, and is happy.

“ 2. Again, the general aspect of wealth in America is such as to give occasion for thanksgiving to-day. The prodigious facilities for developing wealth are only just beginning to be perceived by the mass. The future fortunes of America will be fabulous. I suppose that there are to be fortunes on this continent, compared with which what were called fortunes once, will seem like penury. The power of organising seems to be almost the only limit. The wealth is here. It is easy to be developed. It is easy to be concentrated. It is grow-

ing easier every decade of years to be administered. And to be the owner of a million dollars, will not make a man eligible to the class of rich men much longer. I look forward into that "golden" future, literally, which is opening before us, and marvel whether the most poetic dreams of growing wealth may not fall short of the reality. By and by there is to be a genius shown—there are yet to be reputations, and very noble reputations—for organising and amassing wealth, compared with which we have had almost nothing in the past history of nations.

"There are some who think that riches are always and only dangerous. Riches are dangerous simply because they are power; and all power is dangerous. Power is dangerous whether it be legislative or moral power. Even variety of influence is dangerous. And wealth is more dangerous than other forms, simply because it is a more various power, and has certain facilities for adaptation and use which belong to almost no other power. But it is impossible to civilise a community without riches. I boldly affirm that no nation ever yet rose from a barbarous state, except through the mediation of wealth earned. I affirm that the preaching of the gospel to the heathen will be invalid and void, if it does not make them active workmen, and teach them how to make money. And although the evidences of the conversion of the individual are not that he knows how to make money, yet in a nation no religion is a good religion that does not teach industry, and the thrift which comes from industry. For the law of communities is not analogous to the law of the individual. It is possible, in a great, rich, civilised community, for an individual man to be powerful, and preeminently so, and yet be poor; but no poor man can be of very great validity in a poor community. The community must be rich if he is to have power. It is the contrast, it is the self-denial, it is the moral efficiency without those other and external instrumentalities, that make him so marked, if he labours with

voluntary poverty. But no *community* can develop into permanent civilisation, unless it has power ministered to it very largely through the civilising influences of wealth. This alone will give the activity required ; this alone will give the leisure in which men soften, and ameliorate, and grow beautiful.

“Now, the dangers of wealth in America are very great. They are even greater than we fear. Organised wealth is one great danger which lies ahead, looming up gigantically. And yet, wealth must be organised. The community will have to find ways in which to protect itself, however. If wealth be organised to do as it pleases, it becomes very dangerous. Nevertheless, organised wealth is yet to be a benefactor of the community, to an extent that we have never suspected. It tends now to despotism ; but it is because it is in the nascent stages.

“Great corporations are dangerous. They do not need to be. Scores of millionaires organised together in concert to accomplish great ends, need not be any more dangerous than the State is. There may be an empyrean of wealth ; and it may be mischievous, but it does not need to be. At present it is so, and is to be watched against. Wealth tends to control all other power in society. Especially is it so in democratic societies, where we have no kings, no nobles, no fixed estate of honour, no titles, no positions which are permanent, and where wealth and character make the distinction, very largely, between man and man. Under such circumstances wealth tends to absorb into its own hands all the power in society. But it is not necessarily so. It is not necessary that riches should control courts and legislatures, and the franchise itself. It is not necessary that wealth, which owns the market, should also own the civil power, though it is a danger that is to be met and overcome. It tends to feed the lower nature ; it tends to change refinement to luxury, and luxury to corruption ; but it does not need to do this.

“These are valid, imminent, pressing dangers, that never have been exaggerated ; and yet they are not dangers which necessarily attend the accumulation and organisation of great wealth in any community. It will require the vigilance of statesmen, and of philanthropists, and of good citizens, to guard against the dangers of wealth. But it is not philosophical to look only on the diseases of a community. It is wise to look at its hygienic qualities as well.

“Is harm and danger, then, all that wealth is accomplishing in our midst? No. It is the almoner of employment. It is the almoner of unnumbered households. It is the almoner of independence. And are we to forget that capital—that is, wealth in activity—with all its friction, is far safer than invested wealth, lying dead? It is money that is working that keeps bright, and it is money that is working that keeps men bright. Although working money is by various exigencies brought into circumstances where it must be limited, overruled, and curtailed, yet we are not to forget on this account that at the same time it is that which is vivifying industry to the bottom of society, and that is carrying out on its broad hands and arms innumerable blessings to every part of the community. The very circulation of the community would cease, almost the moment that wealth should cease to exist. It is the blood that carries nutrition into every part of the whole system.

“Riches, therefore, may be said to be the poor man’s providence, provided it is riches in use, and not invested. When men have retired from business, and their wealth is laid up, there is less danger from it ; but there is less benefit from it at the same time. The dangers which we see threatening us are not less than real ; but looking comprehensively at the general tendency of wealth in America, it is working in subordination to intelligence and to domestic virtue. There is a vast deal of ignorant using of wealth. A great many men use their property for ostentation ; and a great many employ it for use-

less pride ; and a great many use it for selfishness, and even for vice. But how to use money is an art just as much to be learned as how to make it. There are a great many men that know how to make money, who do not know how to use it ; and there are a great many men that know how to spend money, who do not know how to make it. Both sides are to be learned. Neither comes by nature. There is art in it as much as there is in learning to paint, or to carve, or to fabricate at the blacksmith's forge, or at the joiner's bench. And men must not be expected to learn it in a generation. There are hundreds and thousands of men who began with literally nothing, and have ended with two or three hundred thousand dollars which they have to organise and commute into forms of civilisation ; and is it strange that a great many men do not know how to do it ; that they sometimes build and furnish extravagantly and out of taste ? My wonder is that there is so much taste and discretion exercised. For if you go through town after town, and village after village, and city after city, you will find that extravagant building and furnishing are the exception—not the rule. The rule is that wealth which has been earned wisely is being expended discreetly. I think that wealth to-day is being used more for building up American homes than for almost all other purposes. I think that the people live in better houses here than they do in any other country, the world over. I am sure they do. Men of the same rank in life, of the same professions, and of the same conditions of wealth, live in better houses, more amply stored, and with more conveniences, here than anywhere else. There is more ingenuity in the construction of houses here—and it requires more ingenuity to keep them constructed !—than in any other land on the globe.

“ Nowhere else will you find so many homes that are filled with elegance. Nor are we to suppose that all the elegance goes with the city and the town. You shall hear the sound of the piano in every cluster of three houses throughout the

land, almost, from ocean to ocean. And if there is anything in this world that is a luxury, it is an instrument of music. You cannot eat it; you cannot take it for medicine; you cannot sell it—generally; it has none of those ear-marks which men attach to other property; and yet there is almost nothing else which men so much covet everywhere. The carpenter, the blacksmith, the farmer, if he has a daughter, wants an instrument of music. And it has ceased to be considered extravagant. The statistics of the piano-manufacturers of America (and they are not all in New York, nor in Boston, nor in Baltimore, nor in Philadelphia: go back into the inland villages, go into some mid-county of the State of New York, and you shall find there rising before your sight, never heard of before, a factory of pianos, that sells its hundreds and thousands of pianos every year, though it would seem as though there were more thousands made in this city than could be bought by all the world put together)—the statistics of the manufacturers of that one single item epitomise the extent of the home comfort and elegance to which the people of America have attained. It is remarkable. There is no land on earth where individual men earn so much money as in America. I suppose that the money-producing force in our country is greater than that of any other people—(a hint to tax-payers)! Not only that, but this money-producing power is accompanied by a greater power to use money for the furtherance of home purposes here than anywhere else. For land is so cheap that it is hardly considered treasure in the same sense that it is in Europe, where it is almost impossible to get it, and where to own land, as in England, is almost to have a title, there being but some twenty-five thousand land-owners in all Great Britain. But in America land is so cheap that it is no sign that a man is wealthy because he owns land—oftentimes the contrary!

“People, therefore, in the administration of wealth, accumulate not so much great estates as houses, and well-furnished houses. Is it a strange thing to go into a working man’s

house, and to find his five hundred volumes? It is less frequent than it should be, but it is not at all strange. Is it strange to find in the houses of plain labourers magnificent libraries? Old Dowse of Cambridge, a tanner and currier all his life, bears witness. He had one of the finest libraries in all Massachusetts. It was composed of the choicest books, admirably selected, and finely bound, and they were books that he read, too. Cambridge was to have had it, but some of the people there saw fit to insult him because he was a tanner and currier, and so he slipped by them, and gave it to the Historical Society or some other institution in Boston; and there it is; and when I want to go on a pilgrimage, and cannot go to Mecca nor to Jerusalem, I go there to see the tanner and currier's library.

"It is not strange to find a man who works at the forge all day, grim and grizzly, going home at night to pursue historical reading. I know farmers that I should dislike to meet in an argument (unless I was on the same side with them!) And they are not cases here and there, selected. It is characteristic of our working people, and of men that are well to do, that they are growing up to make the town in which they live beautiful and intelligent. Their houses themselves are often models of taste and convenience, and are setting examples which, one by one, the neighbours follow. And so, in the train of industry comes wealth, and of wealth, taste, and of taste, beneficence; and refinement flashes throughout the land. And when I hear men speaking bitterly against wealth, I notice that almost invariably they are men who have not got it. When I hear them deride moneyed men, moneyed kings, moneyed princes, it seems to me that they have not well considered the facts. They only think of here and there, it may be, a Croesus. But if you follow the more moderate fortunes; if you look into the whole career of money in this land, not the Nile, when it comes down with its annual freshet and distributes the slime which is the riches of Egypt

over the circumjacent territory, is so great a blessing to Egypt, as is the great diffusion of wealth in this country to America. And nowhere else does wealth so directly point towards virtue in morality and spirituality in religion, as in America.

“So then, I am not afraid to rejoice. Get rich, if you can. Pay anything for riches. Anything? Yes, pay yourself; pay weariness; pay head-cracking thought; pay anything but this—do not pay your honour, nor your affection, nor your simplicity, nor your faith in man, nor your love to God. But whatever you can take out of the body, pay. And when you shall have amassed wealth, it will be God’s power, if you are wise to use it, by which you can make your home happier, the community more refined, and the whole land more civilised.

“Wealth in America, also, is public-spirited. The classes that are amassing money furnish a large proportion of all the funds by which the active charities of society are carried on. The buildings which decorate our community are from the hands, mostly, of wealthy men. Architecture is the adopted child of wealth. The fine arts could scarcely exist but for the interposition of wealth. The universities, and academies, and colleges, and public libraries, and reading-rooms, and halls for lectures, are the fruit of liberal wealth in America. Cornell, Vassar, Cooper, Williston, Lawrence, and a hundred others, are significant American names. And there are more coming forward, who yet will not simply be known by their money among those that love them, but whose names will become symbolic of some great public charity, or some great public spirit.

“Wealth is searching out the neglected classes, is distributing from our cities vagabond children; is opening schools for the labouring classes, to teach them all mechanic arts. I may safely say that no public need can be wisely presented to the wealth of America and not be liberally, and in time munificently, taken care of. In other lands, governments give

much for public institutions ; but in America the great bulk of the means required to build up the institutions of civilisation, and to support them, is contributed by the people, and by the business men of the people.

“Wealth, then, like its owners, has its devil and its temptation ; it has its mistakes and perversions ; it has its great dangers to society ; but its blessings are a hundred-fold. And, on the whole, the general tendency of wealth is such as to lead me to-day to thank God for the increasing wealth of America. May it ever be sanctified. May it ever learn nobler uses, and aspire higher and higher, until the symbolism of the heavenly state, where the very streets are paved with gold, shall be reproduced in the realities and actualities of our life here on earth.”

THE COMING RACE—THE FUTURE.

Civilisation is the result of society, which I have already defined to be a collection of individuals among whom there is a division of labour. The greater the aggregate the grander is the civilisation.

Society first began with the family. A number of sons undertook to do the fighting, while others performed the labour for the home-circle ; and the father appointed himself overseer and adviser.

The family organisation could be only a very transient one. Population rapidly increases, and the family shortly becomes a tribe or community, composed of warriors, priests, and slaves ; and such communities are finally forced to join together and form states—a more persistent type. Such a type of society was ancient Greece ; she never was a nation, but a collection of little independent counties or cities, which were continually at war, or to use an anti-classic phrase, continually squabbling with each other. If these states had united into a nation, Rome would not have subdued them. Rome herself was but a repetition of the same assemblage of small states, which the

Cæsars long and vainly tried to unite; but the territory was too large, the materials too crude. There came a great crash instead, and society fell to pieces.

The largest society that existed during the Middle Ages was the community, the feudal castle and its dependencies. France was the first to form a true nation, England followed, and Germany now, for the first time, has succeeded in uniting her thirty-nine little states into a whole. Switzerland, Holland, and Belgium only are left out of these great modern organisms, and serve to remind us of the type of the antique world. Five years ago Baden-Baden was such an independent state—a country which, from one of its high hills, you could survey at a view, yet having its king and its palace, its fortified town, and its mighty army of a hundred men. The ludicrous aspect of such a state of things is well presented in Offenbach's "Grande Duchesse."

The popular classification of plants used to be herbs, shrubs, and trees. It was the beginning of botanical science; the incipient science of sociology has not yet reached even this low stage. We have not yet discovered that the "five great monarchies of the eastern world" were nothing else than political *herbage*; that Greece, Rome, Palestine, Carthage, Venice, Florence, Holland, with all their fine art, are exceedingly pretty flowering *shrubs*, and that Great Britain, France, the United States are wide-spreading *trees*.

As in the great geologic ages, fern follows weeds, and tree follows fern, so in the minor historic ages communities are succeeded by states, and these by nations. This is the philosophy of history.

And now, when the *nation* has become a successful reality, something still higher is looked for—namely, a federation of nations. Already steps have been taken in this direction; the system of weights and measures, originated by France, has become universal—a universal currency has been proposed, and accepted by France and Germany (but rejected by Eng-

land, who prides herself that her gold is two per cent. better than anybody's else) ; a universal language, too, is often talked of ; and the idea is by no means chimeric. Among the signs of the times further may be noticed the organisation of the International and the Great Exposition.

The following item from an American paper is further to the point :—

“Messrs D. Appleton & Co., of this city, announce an important and suggestive publishing enterprise. Professor Youmans, during his recent trip, has made arrangements for bringing out simultaneously in France, Germany, England, and the United States, an international series of text-books on the various branches of physical, biological, and sociological science. The circular says :—

“ ‘ It has been a main purpose in arranging this series to give it an authentic character. Each book will be from a recognised master of his theme. To secure this object a committee of three of the most eminent scientific men of London will decide upon the English contributions to the series, and corresponding committees have been formed in Paris and Berlin to determine upon the French and German contributions. The following gentlemen have engaged to prepare volumes for the International series :—Dr William B. Carpenter, Professor Tyndall, Professor Claude Bernard, Herbert Spencer, Professor Rudolph Virchow, Dr Henry Maudsley, Mr J. N. Lockyer, Professor Huxley, Dr Edward Smith, Dr J. Rosenthal, Professor A. de Quatrefages, Dr H. C. Bastian, Dr Balfour Stewart, Professor Wurtz, Walter Bagehot, Esq., Professor Widdeman, Dr Michael Foster, Professor A. C. Ramsey, H. Sainte-Claire Deville, Sir John Lubbock, Dr Lauder Lindsay, Professor W. K. Clifford, Professor Berthelot, Rev. M. J. Berkeley, Professor W. T. Thistleton Dyer, Professor Bain, and Professor W. Stanley Jevons. These gentlemen have taken their topics, and several of them are engaged on their works. Other eminent authors, as Wallace, Helmholtz, Parks, Milne-Edwards, Haeckel, Pasteur, and Bates, have given strong encouragement that they will also take part in the enterprise. The International Scientific Series will be published by the Appletons, of New York ; H. S. King & Co., of London ; Ballière, of Paris ; and Brockhaus, of Leipsic ; and the authors will receive

a "royalty," or per centage, in accordance with the American plan, from the publisher of each country. The project thus combines two important objects—First, it secures from the ablest thinkers of the age an elaborate series of valuable books, to be circulated in a cheap form for the promotion of sound public education ; and, second, by combining the proceeds of four markets of the leading countries of the world, it secures for these authors an unprecedented scale of remuneration.'

"Our readers will not fail to notice that not a single American appears as a contributor to this admirable 'International Scientific Series,' and justly so, for America has no adepts in the higher walks of the positive sciences. We are still fighting over the old insoluble questions, and adding hardly anything but translations and adaptations to the literature of the world. Let us hope that with the death of the present race of *savants* men will arise to fill their places more imbued with the real wants of the time, and more anxious to improve science than minister to their own fame."

Such an announcement has been hailed with joy by every friend of progress. The reproach here cast upon America is perhaps unmerited. We must not forget that at least it was a Yankee who concocted and is carrying out the scheme. Perhaps it may be the peculiar function of America to invent great progressive machines and schemes like Atlantic cables and international systems of education.

It may be their province further to set a great political example for the world. They have already determined that the *nation*, as known at the present time, is not expansive enough for them. Four great nations, one bordering on each of the waters, the Atlantic, the Gulf of Mexico, the Great Lakes, the Pacific, New England, a Southern Confederacy—in short, the European model—will *not do* for them. They must have an *ocean-bound republic*, not a nation, but something new—a social mammoth. I see no reason why they should not succeed, even though all history be against them. I see no barrier to the increase of the social organism except the great natural one, the ocean.

THE FOUR QUARTERS OF THE GLOBE.

The function of scientific theory is prediction. I predict, then, that in the future there will not be as now, a thousand races, and nations, and languages; that there will be no Turkey threatened by a Russia, no Prussia struggling with a France, and no Great Britain looking on and preserving the balance of power. I declare that in the future there will be but four nations. Here is the proof.

Society, to all the intents and purposes of logic, as I have already explained, is an animal. It must, therefore, follow the law of the geographical distribution of animals.

Murray, in his geography, lays down four great zoological provinces. Each of these provinces has its own peculiar style of fauna and flora; each its own peculiar "facies." Any race or unknown specimen of creature being presented to a scientist, he can tell to which of the grand divisions it belongs. It has the peculiar "air" or "style" of its habitat. These great provinces are—the Europo-Asiatic, the Indo-African, the Polynesian, and the American.

Let me illustrate. Take the race or genus *Felis*. In Africa this race assumes the characteristics which make up what we call lion; in Asia it appears as the tiger; in America as panther.

Next the genus *homo*. In Europo-Asia it is yellow, or yellow-white; in Africa it is black; in America, red; in Oceania, brown. Finally, we come to the genus of higher order, society, which is yet in its infancy. When maturity arrives, it can no more fail to exhibit the four inevitable species than there can fail to be an Atlantic, a Pacific, an Arctic, and an Indian Ocean.

We shall hear of the speaker of the Asiatic House of Commons, of the proceedings of the African Legislature, the message of the American people, the Polynesian school system. Upon each of these four continents we may fancy a grand

federal capital, a superbly beautiful Utopia several hundred miles in circumference, and throwing its radiations of speech and conveyance, either terrestrial or ærial, to the furthest limits of the continent, in every direction.

In contemplating such a prospect we must not lose sight of the great natural causes which never cease to operate. Political systems are causes, no doubt, but soil and climate are not to be ignored, and greater than all these is *water*.

If we seek an explanation of the peculiar character of the civilised, or partly civilised, inhabitant of any part of the globe, we shall find it in the history of that greatest of natural products, the city of which he forms a part. If now we ask the cause of the special features of this or that city, we have an answer by the careful consideration of the soil upon which it grows. Do we look further, and desire to know whence come those great agricultural peculiarities by which France differs from New York, and Japan from Louisiana, we are brought down to the great waters as a final basis of all. Figuratively speaking, the lands are the children, and the cities are the grand-children of the seas upon which they border. Let us examine a physical map of the earth, one showing the "ocean currents and great river basins" (rivers are the oceans' ministers sent out over the land to convert it), and let us take in a wide view of terrestrial things; we shall see that Boston, New York, and Philadelphia, are true children of the Atlantic; London, Paris, Berlin, &c., on the contrary, are Arctic, or, strictly, Paleo-Arctic cities; Peking, and Canton, and San Francisco are Pacific cities; while Calcutta, Bombay, and Mecca are the especial offspring of the hot Indian Ocean. Each one of the four oceans has a character. The Pacific is crude and vast, like the California trees or the Chinese government; the Atlantic conveys an idea of power without accuracy; the Arctic, like the Frenchman, is already more than two-thirds crystallised, and the Indian is fiery and boiling, as though still in the chaos of the carboniferous epoch.

THE MILLENNIUM.

Finally, there will be one step further, there will be such a perfect network of communication over the seas, that even these will offer no barrier, and there will be but one people, one language, one race ; there will be a planetary federation.

Such a people will doubtless be descended from a single species, and that will be the European. It is a law of nature that the weaker must disappear as the strong increase—the Australian and the Indian are already gone. The Negro and the Esquimaux, on account of the inhospitable climate they inherit, will hold out longer, and the Turk and Tartar will continue for centuries the vain struggle, until they too will pass away.

The coming race, nevertheless, will not be entirely homogeneous ; those members living in the warmer zones will ever tend to grow dark-skinned, passionate, and producers of fine art. They will be the world's artists. More northern members of the federation will be inclined to thought and to science. The cultivation of the soil will be complete ; every animal and every plant will be civilised, and worked into the social organism. The division of labour will be perfect. Even now France manufactures perfumery, and England cutlery, for the whole world.

Of the moral aspect of such an age, I do not venture to speak, but we may expect a reign of perfect happiness—a complete equilibrium—when for every desire there shall be a gratification. This will be the long looked for millennium.

A grave question arises in this connection, as to whether the sun will hold out to burn for a time sufficient for all these changes to take place ; as to whether the geological revulsion to which the earth is subject, will permit these bright visions of poet and philosopher to become realities. Thus far it must be confessed the calculations of *savants* upon the subject are not favourable ; it would seem that life on the earth is doomed

to die a violent, and not a natural death. Man proposes but the attraction of gravitation disposes. If such should be our fate, we must be resigned, remembering that after all we are but a mere speck in the *great* celestial economy, which will lose nothing by our death. If, on the contrary, we should be spared, we must not suppose that the evil day is anything more than postponed; after maturity, there comes invariably degeneration and death. Then will come a time when activity and invention will decay, when thought and feeling will grow benumbed and dead, when terrestrial life, which is now in the flower of its youth, will be subject to the decrepitude of age; children will be born like old men, and birth will be imperfect or impossible. Yet all this will come on gradually and naturally, and will not be the terrible thing that now it might appear. Like a hale old veteran, full of years and honour, peacefully and contentedly we shall descend to the universal tomb, and our great genial mother earth will shortly follow us.

PART FOURTH.

DEATH.

CHAPTER XI.

FOURTH GRAND DIVISION OF TIME.

THE GREAT SUNSET—THE WORLD IS DYING—REPOSE AT LAST.

“There is a calm for those who weep,
A rest for weary pilgrims found ;
They softly lie, they sweetly sleep,
Low in the ground.”

“It is time to be old,
To take in sail ;
The God of bounds
Who sets to seas a shore,
Came to me in his fatal rounds,
And said, ‘No more,
No further spread
Thy broad ambitious branches, and thy root ;
Fancy departs : no more invent ;
Contract thy firmament
To compass of a tent.’ ”

“*Timely wisc accept the terms,
Soften the fall with wary foot.*”

A SHORT time ago, on a day in midsummer, I saw perfection—a rose just expanded in bloom. Its softly unfolded leaves are bathed with dew-drops, its pure tender petals are kissed by the sunbeams, and its heart is entranced with the fervour of a perfect love. So exquisite is its joy, that even its breath and its radiance, the cast-off elements of its life, are perfume and transparent colour. It is the golden age of the rose.

I saw it again a few days later ; the perfume was deeper, the colour more rank, the petals flung outward, in more perfect abandon ; there was discord among them and debauch ; decay had already begun at their tips, evident to me, though

in their hearts they perceived it not. Ah ! I understand, a brazen age.

I passed it again ; discolouration, dispersement, decay ; a hard, dead, and shrivelled form ; of the few remaining members of its leafy brotherhood, clinging despairingly to the receptacle, half are rotten, the other half brown, dried, and bitter. Messallina and Juvenal : an age of iron.

The flower, the nation, man, are analogous. The life of the rose ; the course of great Rome in her grandeur and decadence ; the career of man from the beginning of mature success, when he wears his blushing honours thick upon him, to the death of the lean and slippered pantaloon,—all are subject to the same eternal laws, and naught is true of the one, which may not, with equal certainty,* be predicated of the other.

Historians of the olden time fell into the error of supposing that these three ages constituted the whole of life—a great error : back of the benign Augustus and the urbane Horace stand Lucretia and the barbarian Brutus, and back of these the inevitable savage ; behind the man is the unstable youth and the uncleanly schoolboy ; before the flower there must be the aspiring stem, and before this the sprawling root. Look at that stalk ; how its organs struggle up its rough sides ; it is slimy and its life is tortured by vermin, yet it ever aspires, and puts forth leaf after leaf, each more exact than the last. There is hope and enthusiasm there—it is the plastic age, the age of clay. Turn back a step : What is the early history of the rose ? see, a sickly, crooked white sprout is creeping upward out of the soil ; it looks a miserable woody reptile ; there cling upon its lips traces of the manure which the gardener threw above it ; it is horrible, the vilest of all vileness clings a boon-companion to it. O lady fair, whose cheek and heart are purer than the nosegay in your hand, do you recognise your favourite flower ?

* With equal certainty, but not with equal exactness.—See Buckle's explanation of the two terms.

O men, do you not see that roses cannot be born full-blown? There is a golden age in the affairs of men, and a golden age of the heart; it is followed by the ages of brass and of iron. *It is preceded by long ages of clay and of mud.*

The latter days are short, the early long. Maturity, the golden age, is as 10, the following as 7 and 3; *the preceding ones as 50 and as 30.*

I have tried to paint these long and weary ages of preparation as applied to our great mother. That golden time which must surely follow I dare not attempt. Happy are her sons who shall live to enjoy it, I have believed the study of the past to be more useful. Like others, like all of us, I care not whence I came, but daily wish to know when I am going. But it is only by the contemplation of this dreary darkness past, that the light has broken upon me; *it is darkness, all darkness, there is no garden then, there is no heaven in the past, it must then be in the future.* There is no paradise *lost*, there is then a paradise to be *attained*.

This paradise I cannot paint, I cannot imagine, or, if I should, my idea would not correspond with yours.

My task is a more painful one, it is not to tell you what bliss is, but what it is not. A certain lady of very delicate organisation strives to make her whole life a beautiful one; nothing can induce her to look at one of the simiads, at a new-born child, or upon old age; her time is spent at the piano, in the drawing-room, and in the double-refined landscape of the flower-garden. She has only one terror, it is the thought of growing old. When this visits her mind she has hysterics. I know this lady's notion of paradise; it is perpetual bloom, a never-ending summer, a never-ceasing song, a continual mid-day.

I asked her once if she had ever read Bain's "Logic."

"Qu'est ce que c'est que la logique?" she asked.

"It is what tells me that the state which you picture would be, mathematically, nonentity."

I remember when a boy commiserating an old negro whose thumb nail had, in an accident, been torn out by the roots. "Laws! boss," said he, "I likes to hurt myself sometimes, it feels so gooder when it gots done achin'."

He was a logician.

The logician says: Behold the life of the rose! 50 days of mud, 30 of clay, 10 of gold, 7 of brass, and 3 of iron. And then the round is repeated.

Let us consider Nature in a hundred parts—

PLEASURE AND PAIN ACCOUNT.

	<i>Dr.</i>	<i>Cr.</i>
To grovelling struggles—martyrdom . . .	80	
By perfection, happiness, beauty . . .		10
To degeneration, misery . . .	10	
	<hr/>	<hr/>
	90	10

All attempts to balance the above account are hopeless. It can only be balanced by making a false entry.

What is to be done?

Throw it away; you have no right to open such an account with Nature.

Nature knows as little about your *pleasure* and *pain*, which are so important to you, as the cataract knows of the courtship and divorce of two of its water drops. You are a drop in Niagara; your business is to tumble over a big precipice, then to run a thousand miles, then to climb up to the sky, float, fall, run on again, again to tumble. You are an atom in earth; your business is to evolve and to dissolve, to be born, to struggle, to grow, to develop, to degenerate, to die. Let pleasures and pains alone, then, and attend to your duty; you must perform this ceaseless round; you must perform successively these tasks; it appears to me the best thing you can do is to do them cheerfully, and try to enter into the spirit of each as it absorbs you.

There are no such things in the world as error, ugliness, or

sin ; no such things as bliss or beauty. These words express our blundering immature conceptions of Nature's course. There are three great existences in Nature, and to one of these must belong all our vocabulary of vices, miseries, and ignorances, of graces, pleasures, and virtues, cardinal or otherwise. These existences are Adolescence, Maturity, Degeneration. The duty of a man, of a race, of a planet, is to comprehend these stages as applied to itself, and to pass through each in its proper time, willingly, nobly, with its full heart and soul.

“ By great adamantine laws everlasting,
Here we must all our round of existence
Faithfully finish.”

THE BITTER END.

Of the fate of the solar system there can be no doubt. One after another the planets will cool down, and from their bosom will come forth the varied forms of life. The sun will one day have its geological epochs, its floras and its faunas, its struggle for life and its growth of nervous systems functioned with immortal souls, even like our little earth of the present. Where this poor planet will be in that day, we have only to read upon the face of the moon. “That face is almost entirely made up of huge masses of igneous rock, through which, at short intervals, there yawns enormous volcanic craters whose fires seem to be totally extinguished. The stupendous forces required to bring about such a state of things are now quiescent, but they must have been active once, and this implies that the moon is a dead planet.” We may readily imagine the successive scenes in this act of the drama.

“As heat continues to escape, the expansive energy of the interior is lessened, and it contracts very slowly and in intermittent rhythms, closely followed by the gravitating crust. The violent but brief undulations known as earthquake waves, and the slower but mightier rhythmic upheavals of continents,

are phenomena attendant upon this process of shrinkage, as the pressure of the nucleus here and there temporarily overcomes the resistance of the envelope. Thus alone can be explained the prodigious force displayed in volcanic eruptions. Now, in the latter ages of a planet's history, when the heat is nearly all radiated away, and the expansive force of the nucleus is consequently reduced to a minimum, the ever thickening and hardening envelope will have shrunk in upon the nucleus in such a way as to leave vast abysses capable of engulfing all the air and water which the planet possesses. That such has been the course of events upon the moon is now the opinion generally accepted by competent physicists. Air and water are not discovered upon the surface of the moon, because little by little the lunar oceans and atmosphere have sunk out of sight in these prodigious chasms. Probably, moreover, if we could explore these deep clefts in search of the lunar air and water, we should find them frozen solid there. The degree of cold required to cause such a shrinkage must immeasurably exceed anything within terrestrial experience. It must certainly have been great enough to freeze all the lunar oceans, and it may well have been great enough to liquefy, or even to solidify, the gases of the lunar atmosphere."*

This will be the end of all planets and of the sun itself. So much for the operation of intestine forces ; if we consider, now, what must be the effect of the forces acting from without, it is plain that the great gravitation which, modified by its opponent, the centrifugal force, has moulded the solar system to what it is, will not for an instant cease its hold ; the gaseous atoms of the ether, matter not yet condensed, which fill all intervening space, will continue to bear down and retard the motion of both planets and sun, and as rotation and revolution grow slower, one after another, as its centrifugal powers are thus exhausted, the children will be

* Fiske, Lectures on Evolution.

gathered to the bosom of the parent. We may repeat again the words of the wise man, the astronomer: "There will come a time when the sun, with all his planets welded into his mass, will roll a cold black ball through space."

But the end is not yet. Both observation and reason tell us that it is not; by the great law that action and reaction are equal, that no force can act without generating an opposing force, as the rising pendulum creates the power that brings it down, it follows that when we see a strong action in any direction we are sure of an equally strong action in an opposite direction; a phenomenon seen in the pendulum and the elastic ball, and no less clearly in the French Revolution, and in the "sprees" of the fast young man, when hock, soda, and repentance inevitably follow brandy smashes. By this law we know what is to follow. Clearly the great growth I have been picturing, the growth of the solar system from its beginning as a vast fleecy cloud of fiery gas, to its end as a comparatively small frozen black ball, is but a story of the continued pressure of particles of matter toward a centre, a story of great action in one direction, and that direction *centripetal*.

What then is to be expected? That to such an action there must follow a reaction, that to the reign of attraction must succeed a reign of repulsion. And all through the ages, in very truth, we have here and there caught sight of the master *centrifugal* hand under whose blows the great globe itself shall *dissolve* and leave not a wreck behind.

Perhaps this will not occur, for perhaps our death will be premature; it is not all universes that live out half their days, for death by violence is common; suppose, for instance, that some wandering force from other universes should intrude itself and overthrow the nicely-balanced rhythms of our suns and nebulae around their orbits; there would be a crash then, for all heaven would fall to pieces. What then? such a crash would generate heat enough to reduce the whole

again to its first state of ether, of gas, invisible and ready to commence again the same course, and to work out a new universe. The death of the old would be but the beginning of the new.

“Star after star from heaven’s bright arch shall rush,
Suns sink on suns, system on system crash,
Headlong extinct to one dark centre fall,
And death and night and chaos mingle all ;
Till o’er the wreck emerging from the storm,
Immortal nature lifts her changeful form,
Mounts from her funeral pile on wings of flame,
And soars and shines another and the same.”

The poet has made the catastrophe appear most beautiful ; nevertheless we cannot but pray that the cup pass from us. From the terrible incident of a violent death in life’s prime we gratefully turn to the serene picture of old age.

“To the flower which perfumed the air and charmed the sight, to the young shrub around which the light and frolicsome dance was gaily performed, to the majestic tree whose cool shades gave shelter to the birds and to the shepherds, has succeeded the sad sight of a gnarled oak bent by time, shattered by the storms, and bereft of leaves. Its old trunk is covered with withered moss ; its dry branches, no longer budding, are exposed without protection to the fury of the winds, and only attract our attention by the pale splendour of the snow which enshrouds them, and the drooping icicles that winter has there suspended.”

The curtain rises upon the fourth and last act of the greatest drama of which man can conceive.

We have witnessed the first ; an expanse of invisible gas, slowly condensing into a fiery mist, whose particles gradually gathering in clouds, and sweeping in circles, are like a great whirlpool ; and finally, the whole is aggregated into a vast rolling sphere.

We have seen the second act, when the great sphere drew

forth from its bosom, and cast out one after the other the cloud masses, which assumed the form of the parent, and ever circling about it, the whole forming a harmonious revolving system.

In the third act, the scene is the same, yet now upon the verges of these globes, strange transformations are taking place; each has developed a shell, and exterior to it floats an envelope of clouds and air; there is great pressure on this ocean of gas, and it slowly freezes, building itself into a thousand fantastic forms, like frost work, only of strange mobility, and softness, and colour; partial dissolution too, and reformation, is going on, the half formed and imperfect melt away, and are absorbed by the more beautiful; the hard terrestrial shell is covered with a soft and living garment, as delicate moss covers the cold forbidding rock, as the soft flesh covers the senseless skeleton. We are entranced in watching the evolution of this mighty living beauty. The moment arrives, the earth is in full bloom; those vital forms have reached exquisite perfection; there is nothing that can be added of harmony, of happiness, of beauty. We cry with Faust: "Stand! ye are perfect."

Alas, that our desire should never be realised. Real life is not a comedy but a tragedy; the end of things is not perfection and bliss, but degeneration, death, and dissolution. We have reached the closing scene. The world is decrepit, dying, dead. The vast tissues of plant, and animal, and man, its flesh, mouldering, decaying. The atmosphere, its breath, has flown; the oceans and the rivers, its life-blood, for a long time sluggish and lifeless, now sink, and are congealed deep in its heart. There are yawning chasms between its rocky ribs, and the mountain chains, the world's vertebral column, stand out grim and ghastly from the sunken body. Point your telescope towards the moon, and look if you would see a planetary corpse; there we may read the universal fate, as in the dismantled remains of our loved ones, we read each his own.

A black and ragged rock of prodigious size lies vacillating in celestial space ; once that was the earth, it is now a worthless thing, a corpse or skeleton, awaiting dissolution—waiting for the fire, which everywhere closes the death scene. All that lives must die, and all that die must be consumed ; for only by passing through the fiery ordeal, can the dead become the living. Combustion, either slow or rapid, is the fate of all, a section in the great eternal circle.

These are the sections :—

1. *Birth*, a condensation, a gathering together (*Generatio*).
2. *Growth* (*Crescentia*).
3. *Maturity* (*Divergentia*).
4. *Repose*, death (*Concrescentia*), the great crystallisation.

And then it begins again—birth, growth, new worlds, new systems. We are brought face to face with Father Chronos, CEASELESS WHEEL OF TIME, Abstraction of all abstractions, Eternity, the great mystery.

That mystery, say our teachers, never can be fathomed. It were best to let it alone ; we see as far as it is necessary for us. Man was not made, says the greatest of inspired poets, to solve the problem of the world, but only to learn where the boundary lies, and there to halt.*

Clearly to define this boundary line, and briefly to characterise a few salient features of the more prominent objects that lie within, has been my aim. Within this boundary, this *charmed circle*, the grand cycle, with its four divisions, let us remain. There is material enough here upon which to meditate, without striving to reach further or accomplish more ; let us at least work this well up, before trying to pierce the beyond.

* Goethe.

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